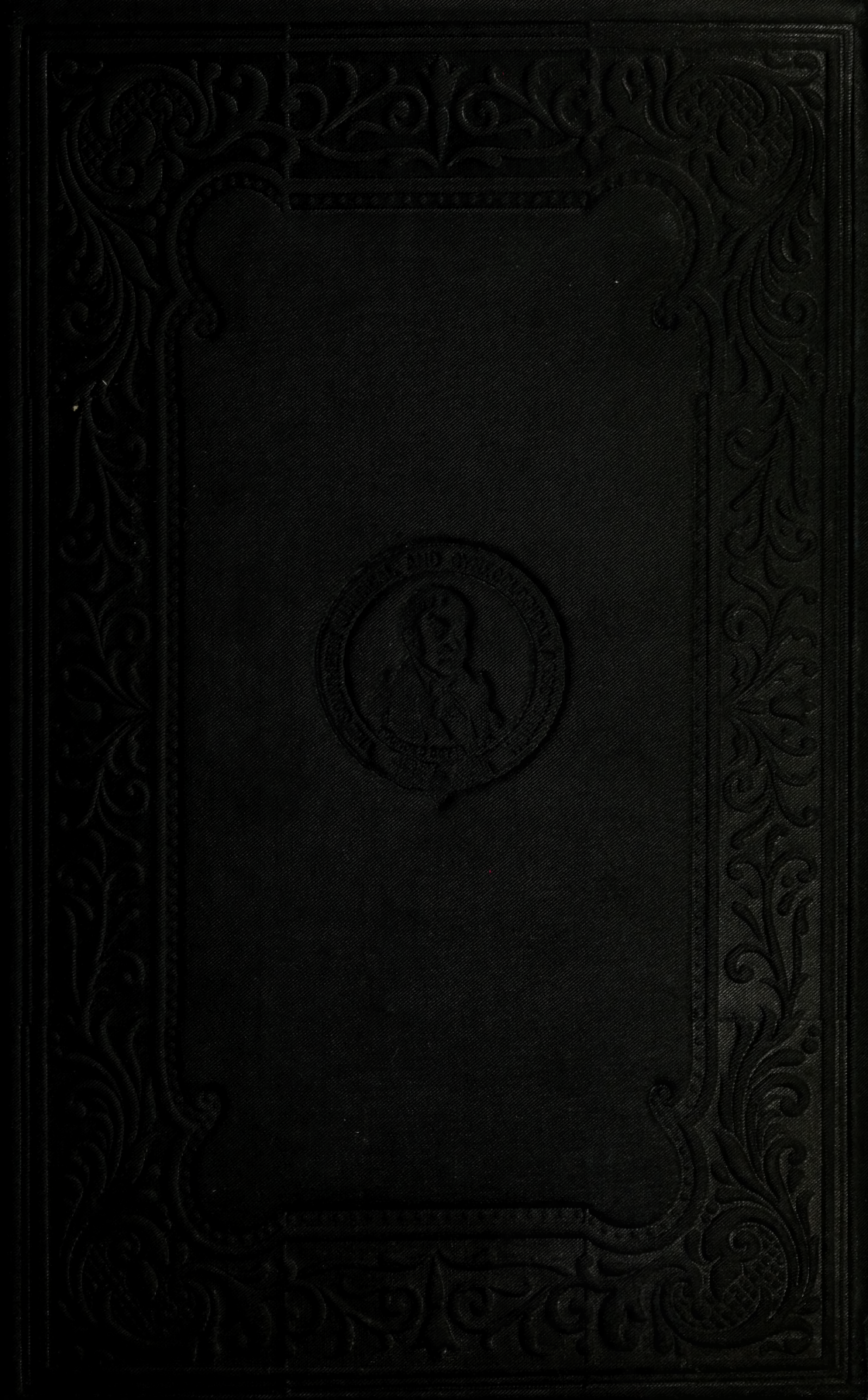

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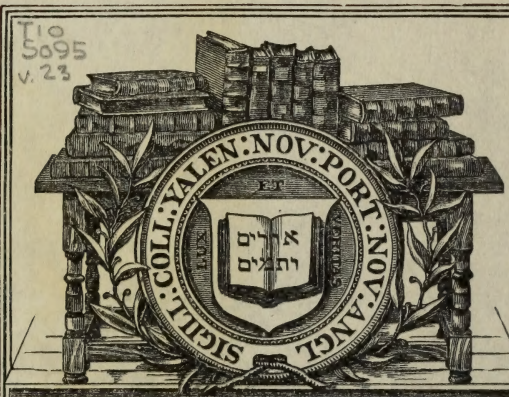

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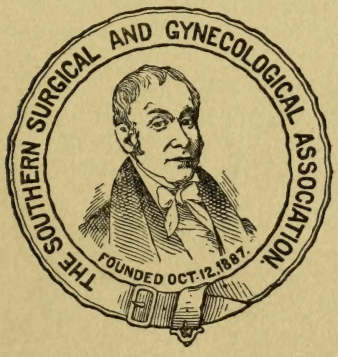

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CONTENTS

Address of the President. Southern Surgeons and Surgery—Before, During, and After the Civil War. By W. O. Roberts, M.D. 1

The Importance of Preserving the Gall-bladder in Operations on the Gall Passages. By John Wesley Long, M.D. . . . 25

Suppurating Echinococcus Cyst of the Liver. Enucleation of Sac. Recovery. By John Chadwick Oliver, M.D. . . 35

Removal of a Tumor of Uncertain Character from the Liver. Recovery. By John Chadwick Oliver, M.D. 38

Chronic Urethritis and Chronic Ureteritis Caused by Tonsillitis. By Guy L. Hunner, M.D. 44

The Best Method of Exposing the Interior of the Bladder in Suprapubic Operations. By Howard A. Kelly, M.D. . . 64

Stone in the Ureter. By R. C. Bryan, M.D. 72

The Early Diagnosis and Treatment of Renal Tuberculosis. By J. M. Mason, M.D. 104

Diagnosis of Ectopic Gestation—When and When Not to Operate. By E. Gustav Zinke, M.D. 121

Cesarean Section, with Special Reference to the Time of Operation and its Technique. By Lewis S. McMurtry, M.D. . 138

Complete Absence of the Vagina—An Operation for the Formation of a Plastic Vagina. By Alex. H. Ferguson, M.D. . 147

A Position for Saving Time and Facilitating Combined Abdominal and Pelvic Outlet Operations. By A. C. Scott, M.D. . . 170

The Treatment of Anteflexion of the Uterus. By Henry T. Byford, M.D. 178

Large Ovarian Cysts. With the Report of a Case. By J. Shelton Horsley, M.D. 185

Report of a Case of Aneurysm, with a New Method of Ligature of the Left Subclavian. By J. Garland Sherrill, M.D. . 190

Complications Following Operative Procedures. By Lucius E. Burch, M.D. 199

An Improved Technique in Goitre Operations. By John R. Wathen, A.B., M.D. 205

Collapse of the Trachea While Performing Thyroidectomy. By T. C. Witherspoon, M.D. 208

Omentopexy. By Maurice H. Richardson, M.D. 219

Some Suggestions Relative to the Preparatory, Operative, and Postoperative Treatment of Cases of Acute Intestinal Obstruction. By John Young Brown, M.D. 241
Further Observations on Cysts of the Pancreas. By Rufus B. Hall, M.D. 252
Carcinoma of the Breast. By Wm. Carpenter MacCarty, M.D. 262
Injury as a Causative Factor in Cancer. By William B. Coley, M.D. 271
Recent Views Concerning the Nature and Treatment of Cancer. By Roswell Park, M.D. 346
Consideration of the Technique of the Radical Abdominal Operation for Uterine Cancer Based Upon an Experience with Forty-four Cases. By Reuben Peterson, M.D. . . . 363
A Malignant Intestinal Growth Requiring the Removal of an Unusual Number of Abdominal Structures. By Thomas S. Cullen, M.D. 370
Volvulus of the Cecum. By H. J. Whitacre, B.S., M.D. . . 381
Two Cases of Intussusception in the Adult; One Due to Multiple Adenomata of the Intestine, the Other to a Sarcoma of the Cecum. With a Discussion of Adenomata of the Intestine. By Stephen H. Watts, M.D. 391
Hypernephroma Arising in the Right Testicle. By James E. Thompson, F.R.C.S. Eng. 408
Pylorospasm. By Stuart McGuire, M.D. 419
Transfusion in Pellagra: Review of Twenty Cases. By H. P. Cole, M.D. 426
Complete Transverse Destruction of the Spinal Cord from Pistol Wound, without Penetration of the Spinal Canal. With a Consideration of Concussion as an Etiological Factor in the Production of this Lesion, and of the Question of Suturing the Cord When it is Completely Divided. By Randolph Winslow, M.D., LL.D. 433
Fibroid Tumors Complicating Pregnancy, Labor, and the Puerperium. By Joseph Taber Johnson, M.D. 446
Practical Application of the Autonomic Nerve Function in the Control of Pain Originating in the Abdomen and Pelvis. By Charles A. L. Reed, A.M., M.D. 452
Acute Multiple Urogenous Abscess of the Kidney Resembling Acute Unilateral Hematogenous Nephritis. By George Tully Vaughan, M.D. 461
Diverticulum of the Bladder with Epidermal Lining. By S. J. Mixter, M.D. 467
Some of the Factors that Influence the Prognosis in Operations for Cancer. By G. W. Crile, M.D. 470
Operative Treatment of Difficult Cases of Palate Defect After Infancy. By V. P. Blair, M.D. 479

Symptoms Simulating Chronic Appendicitis Due to Undue Mobility of the Cecum. By John G. Clark, M.D. . . 484
The Gall-bladder and Biliary Tract an Avoidable Therapeutic Route to the Upper Bowel. Remarks on the McArthur "Drip," and on "Cholecystoduodenal Catheterization." By Rudolph Matas, M.D. 490

In Memoriam:
Willis Goss MacDonald, M.D., LL.D. 519
John Cummings Munro, M.D. 521
J. T. Wilson, M.D. 525

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1896.—Doughty, W. H., M.D. Professor of Special Surgery and Surgical Pathology, Medical Department, University of Georgia; Chief Surgeon to Charleston and Western Carolina Railroad. 822 Greene Street, Augusta, Ga.

1890.—Earnest, John G., M.D. Professor of Clinical Gynecology, College of Physicians and Surgeons; formerly Professor of Gynecology, Southern Medical College; Visiting Gynecologist to the Grady Hospital. 828 Candler Building, Atlanta, Ga.

1907.—Elbrecht, Oscar Herman, M.D. Superintendent and Surgeon-in-Charge of St. Louis Female Hospital; Vice-President, St. Louis Obstetrical and Gynecological Society; Visiting Surgeon on City Hospital Staff. Metropolitan Building, St. Louis, Mo.

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1901.—Fort, Rufus E., M.D. Chief Surgeon, Nashville Terminal Company; Surgeon to Southern and Illinois Central Railroads; Surgeon to Nashville Hospital; *Vice-President*, 1907. 209 Seventh Avenue, N., Nashville, Tenn.

1895.—Fortier, S. M., M.D. Visiting Surgeon to Charity Hospital. 4422 St. Charles Avenue, New Orleans, La.

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1901.—Hazen, Charles M., M.D. Professor of Physiology, Medical College of Virginia. Bon Air (Richmond), Va.

1896.—Heflin, Wyatt, M.D. Ex-President of the Jefferson County Medical Society. Birmingham, Ala.

1905.—Hendon, George A., M.D. Professor of Principles and Practice of Surgery and Surgical Pathology, Hospital College of Medicine. 1826 Baxter Avenue, Louisville, Ky.

Founder.—Herff, Ferdinand, M.D. 308 East Houston Street, San Antonio, Texas.

1889.—Hill, Robert Somerville, M.D. Gynecologist to the Laurel Hill Hospital; Senior Councillor of the Medical Association of the State of Alabama; ex-President of the Montgomery County Medical and Surgical Association; former Surgeon of the Second Regiment, Alabama State Militia. Montgomery, Ala.

1902.—Hirst, Barton Cooke, M.D. Professor of Obstetrics, University of Pennsylvania; Fellow of College of Physicians, Philadelphia; Gynecologist to the Howard, Orthopedic, and Philadelphia Hospitals; Fellow of American Gynecological Society. 1821 Spruce Street, Philadelphia, Pa.

1900.—Hoke, Michael, M.D., B.E. 268 Peachtree Street, Atlanta, Ga.

1906.—Holden, Gerry R., M.D. Formerly House Surgeon, Roosevelt Hospital, New York City; formerly Resident Gynecologist, Johns Hopkins Hospital, and Assistant in Gynecology, Johns Hopkins Medical School. 223 West Forsyth Street, Jacksonville, Fla.

1891.—Holmes, J. B. S., M.D. Ex-President of the Tri-State Medical Society of Alabama, Georgia, and Tennessee, ex-President of the Georgia Medical Association; Fellow of the American Association of Obstetricians and Gynecologists. *Vice-President*, 1894. Valdosta, Ga.

1900.—Horsley, John Shelton, M.D. Professor of Principles of Surgery and Clinical Surgery, Medical College of Virginia; Surgeon to Memorial Hospital. *Vice-President*, 1904. 303 West Grace Street, Richmond, Va.

1896.—Hundley, J. Mason, M.D. Associate Professor of Diseases of Women and Children, University of Maryland; President Clinical Society of Baltimore. 1009 Cathedral Street, Baltimore, Md.

1903.—Hunner, Guy Le Roy, M.D. Associate in Gynecology, Johns Hopkins University; Professor of Genito-Urinary Surgery, Woman's Medical College of Baltimore; Gynecologist-in-Chief, St. Agnes' Hospital; Visiting Gynecologist, Church Home and Hebrew Hospital, Baltimore, Frederick City Hospital, Frederick, Md., and Hagerstown Hospital, Hagerstown, Md.; Consulting Gynecologist, Brattleboro Memorial Hospital, Brattleboro, Vt. 2305 St. Paul Street, Baltimore, Maryland.

1900.—Ill, Edward Joseph, M.D. Surgeon to the Woman's Hospital; Medical Director, St. Michael's Hospital Gynecologist and Supervising Obstetrician, St. Barnabas' Hospital; Consulting Gynecologist to German Hospital and Beth Israel Hospital of Newark, N. J.; to All Souls' Hospital, Morristown, N. J., and to Mountain Side Hospital, Montclair N. J.; Vice-President from New Jersey to Pan-American Congress of 1893. 1002 Broad Street, Newark, N. J.

1908.—Irvin, James S., M.D. Danville, Va.

1889.—Johnson, Joseph Taber, M.D. Professor of Gynecology and Abdominal Surgery, Georgetown University; formerly Gynecologist to Providence Hospital; Chief of Service of Gynecology and Abdominal Surgery, Georgetown University Hospital, and President of the Board of Administration; President of the Woman's Dispensary, and of the Medical Society of the District of Columbia (1887); Member of the British Medical Association; Fellow of the Gynecological Society; President of the Washington Obstetrical and Gynecological Society; Secretary American Gynecological Society, 1886-1890, and President, 1899. *President*, 1899. 926 Farragut Square, Washington, D. C.

Founder.—Johnston, George Ben, M.D. Formerly Consulting Surgeon to the Richmond Eye, Ear, and Throat Infirmary; ex-President of the Richmond Academy of Medicine and Surgery; ex-President of the Medical Society of Virginia;

Member of the American Association of Obstetricians and Gynecologists, and First Vice-President, 1896; Member of the Ninth International Medical Congress; Member of the American Surgical Association; Professor of the Practice of Surgery and Clinical Surgery in the Medical College of Virginia, and formerly Professor of Anatomy; Surgeon to the Old Dominion Hospital; Consulting Surgeon to the City Free Dispensary. *Vice-President*, 1892; *President*, 1897. 407 East Grace Street, Richmond, Va.

1908.—Jonas, Ernst, M.D. Clinical Professor of Surgery, Medical Department, Washington University; Chief of Surgical Clinic, Washington University Hospital; Gynecologist to the Jewish Hospital; Surgeon to the Martha Parsons Hospital for Children; Fellow of the American Association of Obstetricians and Gynecologists. 4495 Westminster Place, St. Louis, Mo.

1910.—Jones, Edward Grove, M.D. Professor of Surgery, Atlanta School of Medicine. 84 E. North Avenue, Atlanta, Ga.

1902.—Jordan, William Mudd, M.D. Surgeon to St. Vincent's Hospital; Gynecologist to Hillman Hospital formerly Assistant Surgeon, U. S. Marine Hospital Service. Birmingham, Ala.

1890.—Kelly, Howard Atwood, M.D. Founder of Kensington Hospital, Philadelphia; Associate Professor of Obstetrics, University of Pennsylvania, 1888-89; Professor of Gynecology and Obstetrics, Johns Hopkins University, 1888-99; Professor of Gynecology, Johns Hopkins University; Gynecologist-in-Chief to Johns Hopkins Hospital; Member Associé Etranger de la Société Obstétricale et Gynécologique de Paris; Correspondirendes Mitglied der Gesellschaft f. Geburtshülfe zu Leipzig; Honorary Fellow Edinburgh Obstetrical Society, Royal Academy of Medicine (Ireland), and British Gynecological Society; Member Washington Academy of Sciences; Fellow American Gynecological Society. *President*, 1907. 1418 Eutaw Place, Baltimore, Md.

1907.—Kirchner, Walter C. G., M.D. Superintendent and Surgeon-in-Charge, St. Louis City Hospital. President Medical Society City Hospital Alumni. City Hospital, St. Louis, Mo.

1899.—Kohlman, William, M.D. 3500 Prytania Street New Orleans, La.

1894.—Leigh, Southgate, M.D. Visiting Surgeon to St. Vincent's and Norfolk Protestant Hospitals; First Vice-President Medical Society of Virginia, 1899-1900. 147 Granby Street, Norfolk.

1893.—Lewis, Ernest S., M.D. Professor of Gynecology, Medical Department of Tulane University. *Vice-President*, 1895; *President*, 1896; *Member of Council*, 1896-1903. 124 Baronne Street, New Orleans, La.

1900.—Lloyd, Samuel, M.D. Professor of Surgery, New York Post-Graduate Medical School; Attending Surgeon to Post-Graduate Hospital and St. Francis' Hospital, and Consulting Surgeon to the Benedictine Sanitarium at Kingston, N. Y. 12 West Fiftieth Street, New York, N. Y.

Founder.—Long, John W., M.D. Emeritus Professor of Gynecology and Pediatrics in the Medical College of Virginia; formerly Gynecologist to the Old Dominion Hospital and the Richmond City Dispensary; Member, ex-Orator, and ex-Vice-President of the North Carolina Medical Society. *Vice-President*, 1902. Greensboro, N. C.

1904.—Lupton, Frank A., M.D. 716 North Eighteenth Street, Birmingham, Ala.

1902.—McAdory, Wellington P., M.D. Surgeon to Hillman Hospital. Birmingham, Ala.

1895.—McGannon, M. C., M.D. Professor of Surgery and Clinical Surgery, Medical Department, Vanderbilt University; Chief Surgeon, Woman's Hospital. 118 Eighth Avenue, N., Nashville, Tenn.

1893.—McGuire, Stuart, M.D. Professor of the Principles of Surgery and Clinical Surgery, University College of Medicine; Surgeon-in-Charge, St. Luke's Hospital; Visiting Surgeon, Virginia Hospital; Consulting Surgeon, Virginia Home for Incurables. *President*, 1908. 518 East Grace Street, Richmond Va.

1891.—McGuire, W. Edward, M.D. Professor of Gynecology, University College of Medicine; Gynecologist to the Virginia Hospital. 411 East Grace Street, Richmond, Va.

1905.—MacLean, Henry Stuart, M.D. Professor of Pathology, University College of Medicine. 406 West Grace Street, Richmond, Va.

1888.—McMurtry, Lewis S., M.D. Ex-President of the American Medical Association; Professor of Abdominal Surgery and Gynecology in the Medical Department of the Uni-

versity of Louisville; Surgeon to the Louisville City Hospital; Gynecologist to St. Mary and St. Elizabeth Hospital; Gynecologist to Gray Street Infirmary; ex-President of the American Association of Obstetricians and Gynecologists; ex-President of the Kentucky State Medical Society; Corresponding Member of the Gynecological Society of Boston; Fellow of the British Gynecological Society; Ordinary Fellow of the Edinburgh Obstetrical Society; Fellow of the American Surgical Society. *President*, 1891. Suite 610, The Atherton, Fourth and Chestnut Streets, Louisville, Ky.

1888.—McRae, Floyd Willcox, M.D. Professor of Gastro-intestinal, Rectal, and Clinical Surgery, Atlanta College of Physicians and Surgeons; Surgeon to Grady Hospital; ex-President Medical Association of Georgia; ex-Secretary of Section on Surgery and Anatomy, American Medical Association. *Treasurer*, 1901-1903; *President*, 1904. Peters Building, Atlanta, Ga.

*1900.—MacDonald, Willis G., M.D.

1891.—Marcy, Henry Orlando, M.D., LL.D. Ex-President of the American Medical Association; President of the Section of Gynecology, Ninth International Medical Congress; late President of the American Academy of Medicine; Corresponding Member of the Medico-Chirurgical Society of Bologna, Italy; Fellow of the American Association of Obstetricians and Gynecologists. 180 Commonwealth Avenue, Boston, Mass.

1899.—Martin, Edmund Denegre, M.D. Professor of Minor and Clinical Surgery, New Orleans Polyclinic; Visiting Surgeon to the Charity Hospital; Consulting Surgeon to the Eye, Ear, Nose, and Throat Hospital; President Orleans Parish Medical Society; ex-Vice-Pesident American Medical Association. 115 Chartres Street, New Orleans, La.

1909.—Martin, Frank, M.D. Clinical Professor of Surgery at the University of Maryland. 1000 Cathedral Street, Baltimore, Md.

1904.—Mason, J. M., M.D. Gynecologist to St. Vincent Hospital. 1915 Sixteenth Avenue, S., Birmingham, Alabama.

1899.—Mastin, William M., M.D. Fellow of the American Surgical Association; Member of the American Association of Genito-urinary Surgeons; Surgeon to the Mobile City Hospital. Joachim and Conti Streets, Mobile, Ala.

1893.—Matas, R., M.D. Professor of Surgery, Medical Department of Tulane University; Fellow of the American Surgical Association. *President.* 624 Gravier Street, New Orleans, La.

1896.—Matthews, William P., M.D. Professor of Anatomy, Medical College of Virginia; Orthopedic Surgeon to the Old Dominion Hospital. Richmond, Va.

1902.—Mayo, Charles H., M.D. Attending Surgeon, St. Mary's Hospital; Member American Surgical Society; ex-President, Western Surgical and Gynecological Association and of Minnesota State Medical Society. Rochester, Minn.

Founder.—Meriwether, Frank T., M.D. Assistant Surgeon, U. S. A. (Retired). Asheville, N. C.

1899.—Michinard, P. E., M.D. 624 Gravier Street, New Orleans, La.

1888.—Miller, C. Jeff., M.D. Professor of Operative Gynecology, New Orleans Polyclinic; Visiting Gynecologist to Charity Hospital. 1719 Jackson Avenue, New Orleans, La.

1907.—Mitchell, James F., M.D. Surgeon to Providence Hospital. 1344 Nineteenth Street, Washington, D. C.

1901.—Mixter, Samuel Jason, M.D. Surgeon, Massachusetts General Hospital; Consulting Surgeon, Massachusetts Charity Eye and Ear Infirmary; Instructor of Surgery, Harvard Medical School. 180 Marlborough Street, Boston, Mass.

1910.—Moore, James E., M.D. Professor of Surgery, University of Minnesota; Surgeon-in-Chief Northwestern Hospital; Fellow of the American Surgical Association; Honorary Fellow of the American Orthopedic Association; ex-President Western Surgical Association; President Hennepin County Medical Society. 201 Clifton Avevue, Minneapolis, Minn.

1904.—Moran, John F., M.D. Professor of Obstetrics, Georgetown University; Obstetrician to Georgetown University Hospital and Columbia Hospital for Women. Washington, D. C.

1902.—Morris, Lewis C., M.D. Professor of Anatomy and Associate Professor of Gynecology, Birmingham Medical College; Councillor of Medical Association, State of Alabama; Vice-President of Tri-State Medical Society of Alabama, Georgia, and Tennessee. *Vice-President.* 716 North Eighteenth Street, Birmingham, Ala.

1900.—Morris, Robert Tuttle, M.D. Professor of Surgery, New York Post-Graduate Medical School and Hospital. 616 Madison Avenue, New York, N. Y.

1901.—Mullally, Lane, M.D. Professor of Obstetrics and Diseases of Children, Medical College, State of South Carolina; Visiting Physician in Obstetrics and Pediatrics, Roper Hospital. Charleston, S. C.

*1905.—Munro, John Cummings, M.D.

1891.—Murfree, James Brickle, M.D. Formerly Professor of Surgery, University of the South (Sewanee); ex-President of the Tennessee State Medical Society, of the Tri-State Medical Society of Alabama, Georgia, and Tennessee. Murfreesboro, Tenn.

1894.—Murphy, J. B., M.D. Ex-President American Medical Association; Professor of Surgery, Northwestern University; Professor of Surgery, Post-Graduate School and Hospital; Attending Surgeon, Cook County and Mercy Hospitals. 100 State Street, Chicago, Ill.

Founder.—Nash, Herbert Milton, M.D. Consulting Surgeon to the Retreat for the Sick (Hospital), Norfolk, Consultant to the Staff of St. Vincent's Hospital; ex-President of the Norfolk City Medical Society; Member of the State Board of Medical Examiners of Virginia. 296 Freemason Street, Norfolk, Va.

1889.—Nicolson, William Perrin, M.D. Professor of Anatomy and Clinical Surgery, Atlanta College of Physicians and Surgeons; Visiting Surgeon to Grady Hospital; Senior Surgeon to Wesley Memorial Hospital; Senior Surgeon, St. Joseph Hospital. *Vice-President*, 1900. Prudential Building, Atlanta, Ga.

1896.—Noble, Charles P., M.D. Surgeon-in-Chief, Kensington Hospital for Women; Consulting Surgeon, Woman's Hospital; Lecturer on Gynecology, Philadelphia Polyclinic. 1500 Locust Street, Philadelphia, Pa.

1890.—Noble, George H., M.D. Dean and Professor of Abdominal Surgery and Clinical Gynecology, Atlanta School of Medicine; Gynecologist of Grady Hospital; Senior Gynecologist, Wesleyan Memorial Hospital, Atlanta; Fellow of the American Gynecological Association and the American Association of Obstetricians and Gynecologists; ex-President of the Medical Association of Georgia; ex-Secretary of the Section of Obstetrics, American Medical Association.

Vice-President, 1901; *President*, 1905. 131 South Pryor Street, Atlanta, Ga.

1902.—O'Brien, Matthew Watson, M.D. Surgeon, Southern and Chesapeake and Ohio Railways; Member of the American Association for the Advancement of Science. 908 Cameron Street, Alexandria, Va.

1901.—Ochsner, A. J., M.D. Adjunct Professor of Clinical Surgery, College of Physicians and Surgeons; Surgeon-in-Chief, Augustana and St. Mary's Hospital. 710 Sedgwick Street, Chicago, Ill.

1903.—Ochsner, Edward H., M.D. Surgeon to Augustana and St. Mary's Hospital. 710 Sedgwick Street, Chicago, Illinois.

1904.—Oechsner, John F., M.D. Professor of Orthopedic Surgery and the Surgery of Children, Post-Graduate Medical Department, Tulane University of Louisiana; Visiting Surgeon, Charity Hospital. Macheca Building, New Orleans, La.

1902.—Oliver, John Chadwick, M.D. Dean and Professor of Operative Surgery, Miami Medical College; Surgeon to the Cincinnati, Christ, and Presbyterian Hospitals. 628 Elm Street, Cincinnati, Ohio.

1888.—Parham, F. W., M.D. Professor of Surgery in the New Orleans Polyclinic. *Vice-President*, 1899; *President*, 1908. 1429 Seventh Street, New Orleans, La.

1900.—Park, Roswell, M.D. Professor of Surgery, Medical Department, University of Buffalo; Surgeon, Buffalo General Hospital; Member of German Congress of Surgeons, Italian Surgical Society, American Surgical Association, American Orthopedic, and American Genito-urinary Associations. 510 Delaware Avenue, Buffalo, N. Y.

1910.—Payne, Robert Lee, Jr., M.D. Assistant Gynecologist to St. Vincent's Hospital; Surgeon to the Southern Railway; Consulting Surgeon to the Seaboard Air Line Railway. 300 Freemason St., Norfolk, Va.

1899.—Perkins, W. M., M.D. Chief of the Clinic Chair of General Clinical and Operative Surgery, New Orleans Polyclinic; Assistant Demonstrator of Operative Surgery, Medical Department, Tulane University of Louisiana; Visiting Surgeon to the Charity Hospital. Macheca Building, 830 Canal Street, New Orleans, La.

1908.—Peterson, Reuben, A.M., M.D. Professor of Obstetrics and Gynecology, University of Michigan; Obstetri-

cian and Gynecologist-in-Chief to the University of Michigan Hospital. Ann Arbor, Mich.

1899.—Platt, Walter Brewster, M.D. Surgeon to the Robert Garrett Hospital for Children. 802 Cathedral Street, Baltimore, Md.

1889.—Polk, William M., M.D. Dean and Professor of Obstetrics and Gynecology, Cornell University Medical College; Gynecologist to Bellevue Hospital; Consulting Surgeon to St. Luke's, St. Vincent's, New York Lying-in, and Trinity Hospitals; ex-President of American Gynecological Society, and New York Obstetrical Society. 7 East Thirty-sixth Street, New York.

1900.—Porter, Miles F., M.D. Fellow American Surgical Association. 47 West Wayne Street, Fort Wayne, Ind.

*1889.—Potter, William Warren, M.D.

*1889.—Price, Joseph, M.D.

1900.—Ransohoff, Joseph, M.D., F.R.C.S. Professor of Anatomy and Clinical Surgery, University of Cincinnati; Surgeon to Cincinnati, Good Samaritan, and Jewish Hospitals; Member American Surgical Association. 19 West Seventh Street, Cincinnati, Ohio.

1890.—Reed, Charles Alfred Lee, M.D. Ex-President of the American Medical Association; Professor of Gynecology and Abdominal Surgery in the Cincinnati College of Medicine and Surgery; Surgeon to the Cincinnati Free Hospital for Women; Fellow of the American Association of Obstetricians and Gynecologists; Fellow of the British Gynecological Society; ex-Chairman of the Section on Obstetrics and Diseases of Women of the American Medical Association; Secretary-General of the Pan-American Medical Congress, 1893; Honorary Member of the Medical Society of the State of New York. Corner Seventh and Race Streets, Cincinnati, O.

1900.—Rees, Charles Mayrant, M.D. Professor of Abdominal Surgery and Gynecology, Charleston Medical School; Abdominal Surgery and Gynecology, City Hospital; Gynecologist to Shirro's Dispensary. Charleston, S. C.

1899.—Richardson, Maurice Howe, M.D. Visiting Surgeon to the Massachusetts General Hospital; Assistant Professor of Clinical Surgery, Harvard Medical School; Mosely Professorship of Surgery to Harvard University. 224 Beacon Street, Boston, Mass.

1888.—Roberts, William O., M.D. Professor of Principles of Surgery and Clinical Surgery, Medical Department of the University of Louisville; formerly Secretary of the Surgical Section of the American Medical Association. *President*, 1910; *Vice-President*, 1889. 1520 Third Street, Louisville, Ky.

1901.—Robins, Charles Russell, M.D. Professor of Gynecology, Medical College of Virginia; Gynecologist to the Memorial Hospital; Surgeon to the Atlantic Coast Railroad. 8 West Grace Street, Richmond, Va.

1889.—Robinson, William Lovaille, M.D. Fellow of the American Association of Obstetricians and Gynecologists; ex-President of the Danville Medical Society; Member of the Medical Examining Board of Virginia; ex-President of Virginia Medical Society. *Vice-President*, 1899. 753 Main Street, Danville, Va.

1906.—Rogers, Carey Pegram, M.D. Chief of Surgical Staff, St. Luke's Hospital; Consulting Surgeon, Sea Board Air Line Railway. 221 Laura Street, Jacksonville, Fla.

1901.—Rogers, Mack, M.D. Professor of Anatomy, Birmingham Medical College. 212 Twentieth Street, Birmingham, Ala.

1901.—Rosser, Charles M., M.D. Professor of Surgery, Baylor University, College of Medicine; Consulting Surgeon, Parkland Hospital; Attending Surgeon, Texas Baptist Memorial Sanitarium; ex-Vice-President Texas State Medical Association; Vice-President, Tri-State Society of Texas, Louisiana and Arkansas. *Treasurer*, 1904–07. 432 Gaston Avenue, Dallas, Texas.

1899.—Royster, Hubert A., A.B., M.D. Professor of Gynecology and Dean of the Faculty, Medical Department University of North Carolina; Gynecologist to Rex Hospital; Surgeon-in-Chief, St. Agnes' Hospital. *Vice-President*, 1907. Tucker Building, Raleigh, N. C.

1909.—Ruffin, Kirkland, M.D. Surgeon-in-Charge of St. Christopher's Hospital. 218 York Street, Norfolk, Va.

1901.—Runyan, Joseph P., M.D. 203 West Second Street, Little Rock, Ark.

1908.—Russell, Wm. Wood, M.D. Associate Professor of Gynecology, Johns Hopkins University; Associate in Gynecology, Johns Hopkins Hospital; Gynecologist to Union Protestant Infirmary, Baltimore. Baltimore, Md.

1893.—Saunders, Bacon, M.D. Professor of Surgery and Clinical Surgery and Dean of Faculty of Medical Department, Fort Worth University; ex-President, Texas State Medical Association. *Vice-President*, 1903; *Member of Council*, 1908. Ninth and Houston Streets, Fort Worth, Texas.

1910.—Schachner, August, M.D. 844 Fourth Avenue, Louisville, Ky.

Founder.—Schilling, Nicholas, M.D. Cedar Bayou, Tex.

1907.—Scott, Arthur Carroll, M.D. Senior Surgeon, Temple Sanatorium. Temple, Texas.

1899.—Shands, A. R., M.D. Professor of Orthopedic Surgery in the Medical Department of the George Washington University and in the University of Vermont; Orthopedic Surgeon to the George Washington University Hospital, the Emergency Hospital, and Central Dispensary; Charter Member Washington Academy of Sciences; Member American Orthopedic Association; and Honorary Member of Medical Society of Virginia. 901 Sixteenth Street, N. W., Washington, D. C.

1902.—Sherrill, J. Garland, M.D. Professor of Surgery and Clinical Surgery, University of Louisville; Consulting Surgeon to Louisville Hospital. 633 St. Charles Place, Louisville, Ky.

1893.—Simons, Manning, M.D. Professor of Clinical Surgery, Medical College, State of South Carolina; Surgeon to St. Francis Xavier's Infirmary; Surgeon to City Hospital; ex-President Medical Society of South Carolina; President of the South Carolina Medical Association; Member American Association of Obstetricians and Gynecologists; ex-Vice-President Tri-State Medical Society of Virginia and the Carolinas. *Vice-President*, 1895 and 1900; *President*, 1901. 111 Church Street, Charleston, S. C.

1900.—Simpson, Frank Farrow, M.D. Assistant Gynecologist to Mercy Hospital; Gynecologist to Out-patient Department, Mercy Hospital. 524 Pennsylvania Avenue, Pittsburgh, Pa.

1899.—Smythe, Frank Davie, M.D. Surgeon to St. Joseph's Hospital; Assistant Professor of Surgery, Memphis Hospital Medical College; Demonstrator of Operative Surgery; formerly Member of the State Board of Examiners of Mississippi. Porter Building, Memphis, Tenn.

1904.—Stokes, James Ernest, M.D. Salisbury, N. C.

Founder.—Stone, Isaac Scott, M.D. Clinical Professor Gynecology, Georgetown University; Gynecologist to Columbia Hospital, and Associate Gynecologist to Georgetown University Hospital; Member American and British Gynecological Societies; Honorary Fellow of Medical Society of the State of New York; Fellow of the Medical Society of V rginia; Member Washington Academy of Sciences; Washington Obstetrical and Gynecological Society. 1618 Rhode Island Avenue, N. W., Washington, D. C.

1894.—Talley, Dyer F., M.D. Associate Professor of Surgery, Birmingham Medical College; Attending Surgeon to Hillman Hospital; Surgeon to the Talley and McAdory Infirmary; Ex-President of the Jefferson County Medical Society; Member of the Southern Medical Association; Member of the Pan-American Medical Association; Member of the Alumni Association of the Charity Hospital of Louisiana; Member of the Board of Censors of the Jefferson County Medical Society; Member of the Alabama State Board of Censors, Committee of Public Health and Examiners; Fellow of the American Association of Obstetricians and Gynecologists. 1801 Seventh Avenue, Birmingham, Ala.

Founder.—Taylor, Hugh M., M.D. Professor of Practice of Surgery and Clinical Surgery, University College of Medicine; Surgeon to the Virginia Hospital; ex-President of the Virginia Board of Medical Examiners. 6 North Fifth Street, Richmond, Va.

1898.—Taylor, William Wood, A.B., M.D. Gynecologist to St. Joseph's and the Memphis City Hospitals. 246 Randolph Building, Memphis, Tenn.

1892.—Thompson, J. E., M.D. Professor of Surgery in the University of Texas. Galveston, Texas.

1890.—Tompkins, Christopher, M.D. Professor of Obstetrics in the Medical College of Virginia. *Vice-President*, 1903. 116 East Franklin Street, Richmond, Va.

1908.—Torrance, Gaston, M.D. Member Surgical Staff, Hillman's Hospital; also the Sisters' Hospital and St. Vincent's; Fellow of the American Association of Obstetricians and Gynecologists. 325 to 328 Woodward Building, Birmingham, Ala.

1909.—Trout, Hugh Henry, M.D. Surgeon-in-Chief of Jefferson Surgical Hospital, Roanoke, Va. 1303 Franklin Road, Roanoke, Va.

1888.—Tuholske, Herman, M.D. Professor of Surgery, Medical Department, Washington University; Consulting Surgeon, St. Louis City Hospital; Surgeon to St. Louis Polyclinic Hospital. 465 North Taylor Street, St. Louis, Missouri.

1905.—Vance, Ap Morgan, M.D. Surgeon to St. Mary and Elizabeth Hospital; Consulting Surgeon, Louisville City Hospital. 921 Fourth Street, Louisville, Ky.

1893.—Vander Veer, Albert, M.D. Professor of Clinical, Didactic, and Abdominal Surgery, Albany Medical College; ex-President of the American Surgical Association; ex-President of the American Association of Obstetricians and Gynecologists; ex-President of the Medical Society of the State of New York. 28 Eagle Street, Albany, New York.

1909.—Vaughan, George Tully, M.D. Professor of Surgery and Head of Department of Surgery in Georgetown University; Chief Surgeon in Georgetown University Hospital; Visiting Surgeon to the Emergency Hospital; Consulting Surgeon to the Government Hospital for the Insane. 1718 I Street, Washington, D.C.

1891.—Walker, Edwin, M.D., Ph.D. Gynecologist to the Evansville City Hospital; ex-President Mississippi Valley Medical Association; President of the Indiana State Medical Society; Fellow of the American Association of Obstetricians and Gynecologists. 712 Upper Fourth Street, Evansville, Ind.

1905.—Wathen, John R., A B., M.D. Professor of Principles and Practice of Surgery and Clinical Surgery, University of Louisville; Surgeon to St. Anthony's, Louisville City, and University of Louisville Hospitals. 628 Fourth Avenue, Louisville, Ky.

1898.—Watkins, Isaac Lafayette, M.D. Ex-President of the Montgomery County Medical and Surgical Society. Montgomery, Ala.

1907.—Watts, Stephen H., M.D. Professor of Surgery University of Virginia; Surgeon-in-Chief and Director of the University of Virginia Hospital. University of Virginia, Charlottesville, Va.

1901.—Werder, X. O., M.D. Gynecologist, Mercy Hospital, Pittsburgh: Professor of Gynecology, West Pennsylvania Medical College; Consulting Surgeon to the South Side Hospital, Allegheny General Hospital, St. Francis' Hospital, etc. 524 Pennsylvania Avenue, Pittsburgh, Pa.

1888.—Westmoreland, Willis F., M.D. Professor of Surgery, Atlanta College of Physicians and Surgeons. *Vice President*, 1908. 241 Equitable Building, Atlanta, Ga.

1904.—Whaley, T. P., M.D. Lecturer on Genito-urinary and Renal Surgery, Charleston Medical School; Lecturer on Diseases of Skin, Medical College of State of South Carolina; Surgeon to Sherra's Dispensary; Visiting Surgeon, Charleston City Hospital. 13 Wentworth Street, Charleston, S. C.

1902.—Whitacre, Horace J., M.D. Professor of Pathology and Lecturer on Surgery, Medical Department, University of Cincinnati, also Medical College of Ohio; Surgeon to Christ Hospital; Consulting Surgeon to Speer's Hospital. 22 West Seventh Street, Cincinnati, Ohio.

1900.—Williams, J. Whitridge, A.B., M.D. Professor of Obstetrics, Johns Hopkins University; Obstetrician-in-Chief, Johns Hopkins Hospital; Gynecologist to the Union Protestant Infirmary. 1128 Cathedral Street, Baltimore, Md.

1907.—Willis, A. Murat, M.D. Instructor in Abdominal Surgery, Medical College of Virginia; Junior Surgeon to Memorial Hospital, Richmond, Va. 405 East Grace Street, Richmond, Va.

**Founder.*—Wilson, J. T.. M.D.

1905.—Winslow, Randolph, M.D. Professor of Surgery, University of Maryland; Chief Surgeon, University Hospital; Consulting Surgeon, Hebrew Hospital, and to Hospital for Crippled Children. 1900 Mt. Royal Terrace, Baltimore, Md.

1905.—Witherspoon, T. Casey, M.D. Formerly Professor of Operative and Clinical Surgery, Medical Department, St. Louis University; Member of American Association of Anatomists. 307 West Granite Street, Butte, Mont.

1900.—Wysor, John C., M.D. Surgeon-in-Charge, Chesapeake and Ohio Hospital. Clifton Forge, Va.

1900.—Young, Hugh H., M.D. Chief of Clinic, Genito-urinary Surgery, Johns Hopkins Hospital. 1005 North Charles Street, Baltimore, Md.

1902.—Zinke, E. Gustav, M.D. Professor of Obstetrics and Clinical Gynecology in the Ohio-Miami Medical College, the Medical Department of the Cincinnati University; Obstetrician and Gynecologist to German Protestant Hospital; Attending Obstetrician to Ohio Maternity; ex-President of American Association of Obstetricians and Gynecologists. 4 West Seventh Street, Cincinnati, Ohio.

CONSTITUTION.

ARTICLE I.

The name of this Association shall be THE SOUTHERN SURGICAL AND GYNECOLOGICAL ASSOCIATION.

ARTICLE II.

The object of this Association is to further the study and practice of surgery and gynecology among the profession of the Southern States.

ARTICLE III.

This Association shall adopt and conform to the Code of Ethics of the American Medical Association.

ARTICLE IV.

SECTION 1. Any reputable physician who practises surgery or gynecology, and who is vouched for by two members of the Association and recommended by the Council, shall be eligible to membership in this body.

SEC. 2. The honorary members shall not exceed ten in number, and shall enjoy all the privileges of other members, excepting to vote or hold office, but shall not be required to pay any fee.

ARTICLE V.

SECTION 1. The officers of this Association shall be a President, two Vice-Presidents, a Secretary, a Treasurer, and a Council, elected by ballot.

SEC. 2. The President and Vice-Presidents shall be elected for one year, and the President shall not be eligible for reëlection at any time; the Secretary and Treasurer, each, for five years; and the Council as provided for in the By-laws.

ARTICLE VI.

SECTION 1. It shall be the duty of the President to preside at all meetings of the Association; to give the casting vote; to see that the rules of order and decorum be properly enforced in all deliberations of the Association; to sign the approved proceedings of each meeting, and to approve such orders as may be drawn upon the Treasurer for expenditures ordered by the Association.

SEC. 2. In the absence of the President the first Vice-President shall preside, and in his absence the second Vice-President shall preside.

SEC. 3. In the absence of all three, the Association shall elect one of its members to preside *pro tem.*

SEC. 4. It shall be the duty of the Secretary to keep a true and correct record of the proceedings of the meetings; to preserve all books, papers, and articles belonging to the archives of the Association; to attest all orders drawn on the Treasurer for moneys appropriated by the Association; to keep the account of the Association with its members; to keep a register of the members, with the dates of their admission and places of residence. He shall collect all moneys due from the members and pay to the Treasurer, taking his receipt for the same. He shall report such unfinished business of previous meetings as may appear on his books requiring action, and attend to such other business as the Association may direct. He shall also supervise and conduct all the correspondence of the Association, and edit the TRANSACTIONS under the direction of the Council.

SEC. 5. It shall be the duty of the Treasurer to keep a correct record of all moneys received from the hands of the Secretary, giving his receipt for the same; pay them out by order of the Association as indorsed by the President and attested by the seal in the hands of the Secretary.

SEC. 6. It shall be the duty of the President of the Association to appoint an Auditing Committee, consisting of three members of the Association, whose duty it shall be to examine the books of the Secretary and Treasurer, and report on the same on the last day of the session.

ARTICLE VII.

Vacancies occurring in the offices of the Association shall be filled by appointment of the President until the next meeting. He shall also have the appointment of all committees not otherwise provided for.

ARTICLE VIII.

This Constitution shall take effect immediately from the time of its adoption, and shall not be amended except by a written resolution, which shall lie over one year, and receive a vote of two-thirds of the members present.

ARTICLE IX.

The membership of the Association shall be limited to two hundred.

ARTICLE X.

All members who have been in continuous membership for twenty years and have attended fifty per cent. of the meetings shall become life members and be exempt from dues.

BY-LAWS.

ARTICLE I.

The Southern Surgical and Gynecological Association shall meet annually on the Tuesday of the week preceding the week in which Christmas occurs, at 10 A.M., at such place as may be designated at the preceding meeting.

ARTICLE II.

The members present shall constitute a quorum for business.

ARTICLE III.

The annual dues of each member shall be $10, paid in advance.

ARTICLE IV.

The usual parliamentary rules governing deliberative bodies shall govern the business workings of this Association.

ARTICLE V.

All questions before the Association shall be determined by a majority of the votes present.

ARTICLE VI.

The President shall deliver an annual address at each meeting of the Association.

ARTICLE VII.

The Secretary of the Association shall receive at each annual Session a draft from the President, drawn on the Treasurer, for the sum of $500, for services rendered the Association, and to this shall be added the necessary expense incurred in the discharge of his official duties.

ARTICLE VIII.

It shall be the duty of the Secretary, one month prior to the annual meeting, to notify the members of the Association, and urge their attendance.

ARTICLE IX.

The authors of papers shall notify the Secretary, six weeks prior to the meeting, of the titles of their essays, so that they may be incorporated in the preliminary programme.

ARTICLE X.

COUNCIL.

The Council shall consist of five members; and of those elected at the primary meeting, the first shall serve five years, the second four, the third three, the fourth two, and the fifth one year; so that subsequently one member of the Council shall be elected annually to serve five years. No member of the Council shall be eligible for reëlection. The President and Secretary shall be *ex-officio* members of the Council.

This Council shall organize by electing a Chairman and Secretary, and shall keep a record of its proceedings.

The duties of this Council shall be—

1. To investigate applications for membership and report to the Association the names of such persons as are deemed worthy.

2. To take cognizance of all questions of an ethical, judicial, or personal nature, and upon these the decision of the Council shall be final; *provided*, that appeal may be taken from such decision of the Council to the Association, under a written protest, which protest shall be sustained by the Association, and the matter shall then be referred to a special committee, with power to take final action.

3. All motions and resolutions before the Association shall be referred to the Council without debate, and it shall report by recommendation at as early an hour as possible.

ARTICLE XI.

The President shall appoint at each annual meeting a Committee of Arrangements.

ARTICLE XII.

The Council shall have full power to omit from the published TRANSACTIONS, in part or in whole, any paper that may be referred to it by the Association, unless specially instructed to the contrary by the Association, which will be determined by vote.

ARTICLE XIII.

Any member failing to pay his dues for more than one year shall be dropped.

ARTICLE XIV.

No paper shall be read before this Association which does not deal strictly with a subject of surgical or gynecological importance.

ARTICLE XV.

No paper read before this Association shall be published in any medical journal or pamphlet for circulation, as having been read before the Association, without having received the indorsement of the Council.

ARTICLE XVI.

The reading of papers shall be limited to twenty minutes each, except by permission of the Association.

MINUTES OF THE PROCEEDINGS

AT THE

TWENTY-THIRD ANNUAL MEETING

OF

THE SOUTHERN

SURGICAL AND GYNECOLOGICAL

ASSOCIATION,

HELD AT

THE HOTEL HERMITAGE,

Nashville, Tennessee,

DECEMBER 13, 14 AND 15, 1910.

TWENTY-THIRD ANNUAL MEETING.

FIRST DAY.—*Tuesday, December 13, 1910.*

The following-named members were present:

ABELL, IRVIN
BAKER, JAMES NORMENT
BALDRIDGE, FELIX E.
BARR, RICHARD ALEXANDER
BARTLETT, WILLARD
BOSHER, LEWIS CRENSHAW
BOVÉE, J. WESLEY
BROWN, JOHN YOUNG
BRYAN, ROBERT C.
BURCH, LUCIUS E.
BYFORD, HENRY T.
CANNADY, JOHN EGERTON
COCRAM, HENRY S.
COLE, HERBERT PHALON
COLEY, WILLIAM B.
CROFFORD, T. J.
CULLEN, THOS. S.
CUNNINGHAM, RUSSELL M.
DANNA, JAMES A.
DOUGHTY, W. H.
EARNEST, JOHN G.
ELBRECHT, O. H.
ELKIN, WILLIAM SIMPSON
FERGUSON, ALEXANDER HUGH
FORT, RUFUS E.
GALE, JOSEPH A.
GOGGANS, JAMES A.
GRANT, HORACE H.
GUERRY, LE GRAND
HAGGARD, WILLIAM DAVID
HALL, RUFUS BARTLETT
HEFLIN, WYATT
HENDON, GEORGE A.
HOLDEN, GERRY R.
HORSLEY, JOHN SHELTON
HUNDLEY, J. MASON
HUNNER, GUY LE ROY
ILL, EDWARD JOSEPH
IRVIN, JAMES S.
JOHNSTON, GEORGE BEN
JONAS, ERNST
JORDAN, WILLIAM MUDD
KELLY, HOWARD ATWOOD
LEWIS, ERNEST S.
LONG, JOHN W.
MCADORY, WELLINGTON P.
MCGANNON, M. C.
MCGUIRE, STUART
MACLEAN, HENRY STUART
MCMURTRY, LEWIS S.
MCRAE, FLOYD WILLCOX
MASON, J. M.
MATAS, R.
MICHINARD, P. E.
MITCHELL, JAMES F.
MIXTER, SAMUEL JASON
MORRIS, LEWIS C.
MORRIS, ROBERT TUTTLE

Nicolson, William Perrin	Ruffin, Kirkland
Noble, Charles P.	Saunders, Bacon
Noble, George H.	Scott, Arthur Carroll
Oechsner, John F.	Sherrill, J. Garland
Oliver, John Chadwick	Talley, D. F.
Parham, F. W.	Thompson, J. T.
Park, Roswell	Torrance, Gaston
Perkins, W. M.	Trout, Hugh H.
Peterson, Reuben	Wathen, John R.
Rees, Charles Mayrant	Watts, Stephen H.
Richardson, Maurice Howe	Westmoreland, Willis F.
Roberts, William O.	Whitacre, Horace J.
Rogers, Carey P.	Winslow, Randolph
Rogers, Mack	Witherspoon, T. Casey
Royster, Hubert	Zinke, E. Gustav

Letters and messages of regret were received from the following Fellows who were not able to attend the meeting: Dr. J. B. Deaver, Dr. C. H. Mayo, Dr. J. M. T. Finney, Dr. Wm. Warren Potter, Dr. C. M. Rosser, Dr. A. D. Bevan, Dr. George W. Crile, Dr. J. B. Holmes, Dr. J. C. Bloodgood, Dr. Michael Hoke, Dr. Albert Vander Veer, Dr. W. S. Goldsmith, Dr. George Tully Vaughan, Dr. J. B. Murfree, Dr. John C. Munro, Dr. Robert Carothers, Dr. F. T. Meriwether, Dr. V. P. Blair, Dr. Herman Tuholske, Dr. F. F. Simpson, and Dr. Manning Simons.

Morning Session.—The Association met in the Assembly Hall of the Hermitage Hotel, and was called to order at 9.30 A.M. by Dr. R. E. Fort, Chairman of the Committee of Arrangements, who said:

Gentlemen: I will announce the series of meetings and diversions we will have while you are in Nashville.

Tonight the local members will entertain the members of the Association with their wives and daughters, at the Hermitage Club, with a musicale. Tomorrow afternoon we will take the members and their families to the Hermitage, the home of Andrew Jackson. Following that, Dr. and Mrs. M. C. McGannon will hold a reception at their home from 5 to 7 P.M. On the following day (Thursday) our Secretary, Dr. Haggard, will entertain the Society at luncheon in the Rathskeller at this hotel.

We are very glad to have you meet with us in Nashville.

Nashville is the home of two of the ex-Presidents of this Association. The first President of this Association, and one of its founders, was the lamented Dr. Haggard, the father of our Secretary, and the other, Dr. Richard Douglas. We, and the people of Nashville, would be embarrassed by the presence of so distinguished a body if it were not for the fact that they have been accustomed to associating with distinguished men in the medical profession. Within the shadow of this magnificent building there are the homes of three of the physicians who were Presidents of the American Medical Association. I refer to Dr. W. T. Briggs, Dr. Paul F. Eve, and Dr. W. K. Bowling. On behalf of the local members of the Association and the citizens of Nashville I bid you welcome.

In conclusion, I will say we all welcome you here. We are glad to have you with us, and in addition to the little incidental formalities we have spoken of, we want you to know that while you are here you have the key to our city, and it gives me great pleasure to introduce and to turn over this meeting to our distinguished President, Dr. W. O. Roberts, of Louisville, Kentucky.

Dr. Roberts then took the chair.

Papers were read as follows:

1. "The Importance of Preserving the Gall-bladder," by Dr. J. W. Long, of Greensboro, North Carolina.

Discussed by Drs. Cullen, Kelly, Sherrill, Winslow, Fort, Saunders, Coley, and in closing by Dr. Long.

2. "Hydatid Cyst of the Liver, Successfully Treated by Operation," by Dr. John C. Oliver, of Cincinnati, Ohio.

This paper was discussed by Drs. Ferguson, Cullen, Winslow, and Danna.

On motion of Dr. J. Garland Sherrill, the following visitors were extended the privileges of the floor: Drs. James E. Moore, William Carpenter MacCarty, G. P. Hanes, J. T. Windell, Thomas C. Holloway, R. L. Payne, Jr., E. P. Quain, W. O. Bryan, McPheeters Glasgow, Robert Caldwell, A. B. Cooke, A. L. Sharber, and H. M. Tigert.

3. "Chronic Urethritis Caused by Tonsillitis, with Report of Cases," by Dr. Guy Le Roy Hunner, Baltimore, Maryland.

Discussed by Drs. Mason, Holden, Kelly, Royster, Elbrecht, Oechsner, and in closing by the essayist.

4. "The Best Method of Exposing the Bladder for Aggressive Operations by the Suprapubic Route," by Dr. Howard A. Kelly, Baltimore, Maryland.

Discussed by Drs. Horsley, Jonas, Cullen, Peterson, Noble, Bartlett, Ferguson, and in closing by the author of the paper.

5. "Stone in the Ureter," by Dr. R. C. Bryan, Richmond Virginia.

6. "The Early Diagnosis and Treatment of Renal Tuberculosis," by Dr. J. M. Mason, of Birmingham, Alabama.

These two papers were discussed by Drs. Jonas, Sherrill, Hunner, Elbrecht, Coley, Kelly, Byford, and in closing by Dr. Mason.

On motion, the Association adjourned until 2 P.M.

Afternoon Session.—The Association reassembled at 2 P.M., with the President in the Chair.

7. "Diagnosis of Extra-uterine Pregnancy, When and When Not to Operate," by Dr. E. Gustav Zinke, Cincinnati, Ohio.

This paper was discussed by Drs. Earnest, Hall, Saunders, Horsley, Long, Kelly, Sherrill, Peterson, Crofford, and in closing by the author of the paper.

8. "Cesarean Section, with Special Reference to Time of Operation and Technique," by Dr. Lewis S. McMurtry, Louisville, Kentucky.

Discussed by Drs. Zinke, Lewis, Peterson, and in closing by the author of the paper.

9. "The Formation of a New Vagina, with Report of Three Cases," by Dr. Alexander Hugh Ferguson, Chicago, Illinois.

Discussed by Drs. Peterson, Noble, Hall, McGannon, and in closing by the author of the paper.

10. "A Position for Saving Time in Combined Abdominal and Pelvic Outlet Operations," by Dr. A. C. Scott, Temple, Texas.

Discussed by Drs. Bovée, Ferguson, and in closing by Dr. Scott.

11. "The Treatment of Anteflexion of the Uterus," by Dr. Henry T. Byford, Chicago, Illinois.

Discussed by Drs. Jonas, Royster, and in closing by the essayist.

12. "An Unusually Large Ovarian Cyst," by Dr. J. Shelton Horsley, Richmond, Virginia.

Discussed by Drs. Cullen, Ferguson, Lewis, and in closing by the author of the paper.

Dr. Willard Bartlett, St. Louis, Missouri, presented numerous lantern slides of the institutions and hospitals visited by the American Society of Clinical Surgery in its trip to Great Britain.

13. "Report of a Case of Aneurysm, with a New Method of Ligature of the Left Subclavian," by Dr. J. Garland Sherrill, Louisville, Kentucky.

Discussed by Dr. Rogers.

On motion, the Association adjourned until 9 A.M., Wednesday.

SECOND DAY.—*Wednesday, December 14, 1910.*

Morning Session.—The Association met at 9 A.M., with the President in the Chair.

14. "Complications Due to Operative Procedures," by Dr. L. E. Burch, Nashville, Tennessee.

Discussed by Drs. Jonas and Crofford.

15. "An Improved Technique in Goitre Operations, Based on 135 Operations, Illustrated by Stereopticon Slides," by Dr. John R. Wathen, Louisville, Kentucky.

16. "Collapse of the Trachea During Thyroidectomy," by Dr. T. C. Witherspoon, Butte, Montana

These two papers were discussed together by Drs. Morris, Royster, Winslow, Guerry, Jonas, and in closing by the authors of the papers.

The President appointed as an Auditing Committee, Dr. J. Garland Sherrill, Louisville, Kentucky; Dr. J. Shelton Horsley, Richmond, Virginia; and Dr. Hubert A. Royster, Raleigh, North Carolina.

17. "Omentopexy," by Dr. Maurice H. Richardson, Boston, Mass.

Discussed by Drs. Moore, Parham, Morris, Grant, Fort, Mixter, Ferguson, Matas, Danna, and in closing by Dr. Richardson.

18. "Catheterization of the Common Duct as a Practical and Effective Upper Route for Enteroclysis Medication in Toxic Biliary Cases (McArthur's Procedure)," by Dr. Rudolph Matas, New Orleans, Louisiana.

Discussed by Drs. Rogers, Sherrill, Watts, MacCarty,

Cannady, Hall, Richardson, Parham, Ferguson, and in closing by the essayist.

19. "Some Suggestions Relative to the Preparatory Operative and Postoperative Treatment of Cases of Acute Intestinal Obstruction," by Dr. John Young Brown. St. Louis, Missouri.

Discussed by Drs. Horsley, Wathen, Mason, McRae, Moore, and in closing by the author of the paper.

On motion, the Association adjourned until 7.30 P.M.

NOTE.—No afternoon session was held. The members and invited guests took an automobile trip to the Hermitage, the home of General Andrew Jackson.

Evening Session.—The Association reassembled at 7.30 P.M., and was called to order by the Vice-President, Dr. L. C. Morris.

20. "Further Observations on Cysts of the Pancreas," by Dr. Rufus B. Hall, Cincinnati, Ohio.

Discussed by Dr. Goggans.

The President, Dr. W. O. Roberts, Louisville, was then introduced and delivered his address. He selected for his subject, "Southern Surgeons and Surgery Before, During, and After the Civil War."

21. "Tumors of the Breast, Illustrated by Stereopticon Slides," by Dr. William C. MacCarty, Rochester, Minnesota (by invitation).

22. "Casual Relationship Between Injury and Cancer," by Dr. William B. Coley, New York City.

23. "Cancer, Late Views Regarding its Nature and Treatment," by Dr. Roswell Park, Buffalo, New York.

24. "Consideration of the Technique of the Radical Abdominal Operation for Uterine Cancer, Based Upon an Experience of 44 Cases, Illustrated by Lantern Slides," by Dr. Reuben Peterson, Ann Arbor, Michigan.

25. "Malignant Intestinal Growth Requiring the Removal of an Unusual Number of Abdominal Structures," by Dr. Thomas S. Cullen, Baltimore, Maryland.

This series of papers was discussed by Drs. Hunner, Cunningham, Bovée, MacCarty, Cullen, Noble, Coley, Park, and the discussion closed by Dr. Cullen.

On motion, the Association adjourned until 9 A.M., Thursday.

THIRD DAY.—*Thursday, December 15, 1910.*

Morning Session.—The Association met at 9.30 A.M., and was called to order by the President.

26. "Volvulus of the Cecum," by Dr. Horace J. Whitacre, Cincinnati, Ohio.

Discussed by Drs. Watts, Thompson, and in closing by the essayist.

27. "Cases of Intussusception Due to Polypoid Tumors of the Intestinal Tract," by Dr. Stephen H. Watts, Charlottsville, Virginia.

Discussed by Drs. Royster, Hunner, Hall, and in closing by the author of the paper.

28. "Hypernephroma Arising in the Right Testicle," by Dr. James T. Thompson, Galveston, Texas.

Discussed by Dr. MacCarty.

29. "Pylorospasm," by Dr. Stuart McGuire, Richmond, Virginia.

Discussed by Drs. Parham, MacCarty, Byford, Rogers, and in closing by the author of the paper.

At this juncture, Secretary Haggard presented the following report of the Council:

REPORT OF THE COUNCIL.

To the members of the Southern Surgical and Gynecological Association the Council hereby makes the following recommendations:

1. That as an amendment to the report of the Council last year, recommending "That Article IX of the Constitution, providing that a member shall forfeit his membership if he fails to attend three consecutive meetings, be amended by substitutin the word 'five' consecutive years for three consecutive years," be stricken out of the Constitution.

2. That the deaths of Dr. R. J. Nunn, of Savannah, Ga.; Dr. J. T. Wilson, of Sherman, Texas; Dr. W. L. Nolen, of Salem, Va., and Dr. John C. Munro, of Boston, be appropriately recorded.

3. That inasmuch as Dr. Munro was on the preliminary program of this meeting, and the final summons came to

him only last week, a telegram of sympathy be sent to his bereaved widow and family from this Association in session assembled.

4. That the resignations of S. M. Fortier, Reece B. Gillespie, J. F. Y. Paine, and Nicholas Schilling be accepted.

5. That the following names are proposed for Honorary membership:

Sir Thomas Myles, of Dublin; Mr. Mayo Robson, of London; Mr. Arbuthnot Lane, of London; Mr. B. G. A. Moynihan, of Leeds; Mr. Robert Jones, of Liverpool; Mr. H. J. Stiles, of Edinburgh; Mr. Rutherford Morrison, of New-Castle-on-Tyne.

6. That the delinquents, as shown by the books of the Secretary, who are in arrears with their dues, be dropped from membership.

7. That the vacancies in the active membership be filled by the following proposals:

Drs. James E. Moore, of Minneapolis; John Staige Davis, of Baltimore; Francis Randall Hayner, of Washington; Granville S. Hanes, of Louisville; August Schachner, of Louisville; Robert Lee Payne, of Norfolk; Edward Grove Jones, of Atlanta; W. A. Bryan, of Nashville; Robert Caldwell, of Nashville; A. Bennett Cooke, of Nashville.

8. That Washington, D. C., be nominated as the next place of meeting. That Dr. J. Wesley Bovée be asked to act as Chairman of the Committee of Arrangements.

9. The following members are nominated for the officers of the Association:

President—Rudolph Matas, of New Orleans.

Vice-Presidents—Guy L. Hunner and J. Garland Sherrill.

The offices of Secretary and Treasurer, respectively, hold over.

10. That for the vacancy in the Council caused by the expiration of the service of Dr. George H. Noble, the retiring President, Dr. W. O. Roberts, is nominated.

All of which is respectfully submitted.

Howard A. Kelly,
George H. Noble,
George Ben Johnston,
Bacon Saunders,
Stuart McGuire.

SECRETARY'S REPORT, 1910.

To the Officers and Members of the Southern Surgical and Gynecological Association:

The following is a statement of the collections and disbursements of the funds in the Secretary's hands:

RECEIPTS.

December 8, 1909—Balance in bank	$70.00
December 15, 1909, to December 8, 1910—Dues received .	1800.00
December 1, 1910—Interest on deposit	34.52
Total	$1904.52

DISBURSEMENTS.

September 8, 1910—Check to Dr. Wm. Goldsmith, Treasurer	$1566.71
December 9, 1910—Balance in bank	330.00
December 1, 1910—Interest on deposit since Sept. 8, 1910 .	7.81
Total	$1904.52

There remains uncollected from members $350.

There are seven members liable to suspension for non-payment of dues.

Those resigning during the year are: S. M. Fortier, Reece B. Gillespie, J. T. Wilson, J. F. Y. Paine, and Nicholas Schilling.

Deceased members during the year: R. J. Nunn and W. S. Nolen.

Respectfully submitted,

W. D. HAGGARD,
Secretary.

We, the undersigned, have examined and approve this report.

GARLAND SHERRILL,
H. A. ROYSTER,
Auditing Commihtee.

The President, You have heard the report of the Council; what will you do with it?

Dr. Winslow. I move that the report be adopted as read.

Seconded and carried.

The President. I will appoint Drs. Winslow and Hunner to escort the newly elected President to the platform.

The retiring President, Dr. Roberts, said that his successor was so well known that he did not need any introduction.

Dr. Matas, in accepting the Presidency, said: I find it difficult to give expression to the various conflicting emotions that always assail a man in my position. You have lifted me to such a lofty pinnacle that you should not be surprised if I am a little dizzy, as I do not even dare look at my feet for fear of the peril of a fall. Somewhat like the aërial navigators we hear so much of today, who soar so high that they gasp for breath, I even feel in that way somewhat throttled in the grip of the emotions suggested by this occasion. Also the idea of the aviator is welcome at this moment in suggesting that just as the anxious aërial navigator soars above the level of his mother earth and sees spread before him a vast and limitless panorama, he realizes his own atomic insignificance, and so do I in this position. But coming back, gentlemen, to *terra firma*, I can collect my thoughts sufficiently to say that one primitive and simple word we find in every language—"Thank you." I was taught early to read an old Latin maxim in which the words *Gratias agere domine* were devoutly put as an expression of benefactions we received and the Lord vouchsafed his creatures, and I can only say on this occasion, reverting back to the simplicity of early childhood, *Gratias dominus*. I do not think it is possible, to speak frankly, for any man, who is normally constituted and has a normal psychology, not to experience a thrill of pleasure and a quiver of gratification that come to him after years of labor among men whom he most respects, among men whom he has looked upon as exemplars in his profession, who gently stop him on his way and tap him on his back and say: "You have been on the right track; you are doing the right thing." I feel that no matter how obdurate a man may be, how indifferent he may be to the vanities and glories of the world, that element in our constitution must dominate, and he cannot but feel it when he has received the insignia of approval of his fellows. For this, gentlemen, I thank you.

I have spoken too long. I only wish to add in conclusion, and in thanking you again, that whatever we may accomplish in the term that is to follow during the discharge of my admin-

istrative duties, I hope I may vouchsafe your sympathy and enlist your active coöperation, as you have already dispensed them to my predecessors; and, on the other hand, if I can only serve you half as well as the distinguished men who have preceded me in this chair, I shall feel then far more worthy than now of your favor and your kindness.

At the conclusion of Dr. Matas' remarks, the Secretary said: Inasmuch as the morning's program has been completed, and there are only four papers on for the afternoon, I would move, Mr. President, that we continue with the program this morning and finish.

Seconded and carried.

30. "Tumors of the Jaw," by Dr. Willis F. Westmoreland, Atlanta, Georgia.

31. "Degeneracy, the Underlying Cause of Disease; How the Unfit Perish," by Dr. Charles P. Noble, Philadelphia, Pa.

32. "Bladder Diverticulum," by Dr. Samuel J. Mixter, Boston, Mass.

33. "Transfusion of Blood in Pellagra, with Report of Twenty Cases," by Dr. H. B. Cole, Mobile, Alabama.

Discussed by Dr. Long, and in closing by the essayist.

34. "Complete Transverse Destruction of the Spinal Cord with Pistol Wound without Penetration of the Spinal Canal," by Dr. Randolph Winslow, Baltimore, Maryland.

This paper was discussed by Drs. Fort, Watts, Elbrecht, Thompson, and the discussion closed by the author of the paper.

At the conclusion of the reading and discussion of all papers, Dr. Bovée said: I am sorry I was absent from the hall when the report of the Council was presented and accepted, as I have been told since that it is the decision of this body to meet next year in Washington. That being the case, I desire on part of my confrères in Washington, Fellows of this Society, as well as myself, to express my thanks to you for selecting Washington, and we hope the meeting will be as successful as many others we have attended, and I know we will try and do our best to make it a successful meeting.

Before taking my seat, I wish to offer a resolution of thanks for the kind manner in which we have been received and the splendid entertainments we have had in this city by our

confrères and their families; also for the good accommodations we have had at this splendid new hotel; also for the lecture hall as a meeting place.

Dr. Royster. I wish to second the resolution, and at the same time wish to amend it by adding the words that "this is the best meeting the Southern Surgical and Gynecological Association has ever held."

The amendment was seconded, accepted, and the original motion as amended was carried unanimously.

There being no further business to come before the Association, on motion the meeting adjourned to meet in Washington, in December, 1911.

W. D. Haggard,
Secretary.

ADDRESS OF THE PRESIDENT

SOUTHERN SURGEONS AND SURGERY—BEFORE, DURING, AND AFTER THE CIVIL WAR

By W. O. Roberts, M.D.
Louisville, Kentucky.

If you expect either science or surgery, technically speaking, in what I shall have to say, you are doomed to disappointment. To tell you anything concerning the achievements of surgeons during the year of grace just passed would be "carrying coals to New Castle," if not "gilding refined gold," for whatever new has been accomplished will be fully set forth, aired, and discussed during the sessions of this meeting.

I have chosen to set before you the names of some of the masters in surgery, without whose work the work of most of us would not have been done; therefore I shall attempt, in an humble way, the role of historian and biographer; "for what is said of men, whether it be true or false, often occupies as much space in their life, and especially in their destiny, as what they do." Twice has Kentucky set up in the historic old town of Lexington a costly and beautiful statue of Henry Clay, and twice have the thunderbolts of Jupiter shattered it, but not all the thunderbolts and agents of destruction in the hands of ancient gods or modern devils can shake, or paralyze, or pulverize his undying fame.

The more we talk and write about the great and their achievements, the better are we for the exercise, and the greater benefit we confer upon posterity. Few of the worthies of whom I shall speak have had, or will have, statues, or busts, or "storied urns" erected to their memory, but they all have and hold in their work, which they have handed down to posterity, the *monumentum aere perennius*—more lasting than bronze, more stable than marble.

In the annals of the first half of the nineteenth century four great and original names appear. They stand like snow-crowned peaks among the lesser mountains and hills, resplendent in the sunset. These men all did original and some epoch-making work. Their deeds were done chiefly in Kentucky. Their names are Brashear, McDowell, McCreary, and Dudley. They hold first rank among the pioneers of American Surgery.

WALTER BRASHEAR

In 1806 Walter Brashear, of Bardstown, Ky., did the first hip-joint amputation performed in America. Kerr, of North Hampton, England, in 1774 did the first, and the second was done by Larry in 1793. It is safe to say that Brashear had no knowledge of these operations.

He was born in Maryland in 1776. Eight years later his father journeyed to Kentucky, and cleared a little farm near Shepherdsville, Bullitt County. Dr. Brashear was not only a man of great skill in surgery, but added to this a fine literary taste, high culture, and executive ability. He was brilliant in conversation, apt in oratory, and served his adopted State, Louisiana, in the Senate of the United States.

Of him, Dr. David W. Yandell said: "His full nature, like that river of which Alexander broke the strength, spent itself in channels which led to no great name on earth. By a single exploit at the age of thirty he carved his name at high-

water mark among the elect in surgery. Most of his life thereafter he wasted in desultory labors." He died at an advanced age at his home in Louisiana.

EPHRAIM MC DOWELL

In 1809 Ephraim McDowell, of Danville, Ky., did the first ovariotomy, writing his name so high in the temple of surgical fame that time shall not tear it down.

It is needless in this presence to comment upon this unique and sublime achievement. Medical orators have waxed eloquent upon it on all fitting occasions since. Medical authors have written volumes about it, with which we are but too familiar, and generations of surgical disciples have reverently followed the master's footsteps. Hundreds of years have been added to the life of women, thousands of children owe their lives to this surgical procedure, and men of note in foreign lands have made long pilgrimages to lay their votive offerings upon his tomb.

CHARLES MC CREARY

In 1813 Dr. Charles McCreary, of Hartford, Ohio County, Ky., did the first complete extirpation of the clavicle. The disease for which the operation was done was said to have been scrofulous. Recovery was slow but complete, and the use of the arm remained good.

In 1829 Prof. Valentine Mott, of New York, repeated the operation, and supposing himself to be the first in the field, claimed the honor of the procedure for the United States, New York, and himself.

There is little known of the life and character of Dr. McCreary. He is said to have been a serious, thoughtful man, given to study, and devoted to his calling. He died at the early age of thirty-seven.

BENJAMIN WINSLOW DUDLEY

Another pioneer in Southern surgery is Dr. Benjamin Winslow Dudley. He was born in Spottsylvania County, Va., April 25, 1785. His family settled in Lexington, Ky., when the child was but one year old. He died in 1870, at the age of eighty-five. He was the son of a pioneer. He was raised in a small village in the midst of the Western wilderness. He was self-made. Like his great contemporary, Abraham Lincoln, he played flat-boatman that he might secure an education. He overcame all difficulties. He studied at the great schools of Paris and London, returning to Lexington in 1814, where he began a career almost unprecedented in the annals of surgery. His name and fame are the property of all, and it is not too much to say that hereafter, as up to the present time, no treatise on surgery will discuss Lithotomy without mention of his mane.

These illustrious men were, as I have said, the pioneers of surgery in the South, particularly in Kentucky; but their labors closed with the middle or early years of the first half of the nineteenth century.

A ROLL OF FAMOUS NAMES

Succeeding them was a goodly number of young surgeons, some of whom during our civil war pursued their calling in one or the other of the great armies engaged in that conflict. Prominent among them were Hunter McGuire, Bedford Brown, J. McFadden Gaston, Tobias G. Richardson, Paul F. Eve, W. T. Briggs, Warren Stone, John T. Hodgens, Willis F. Westmoreland, H. H. Mudd, Samuel D. Gross, W. W. Dawson, P. S. Carson, J. Marion Sims, Robt. Battey, David W. Yandell, J. Billings, Claudius H. Mastin, A. W. Smyth, Josiah C. Nott, and Crawford Long. A number of these worthies learned the art of surgery during our civil

war, though some had attained distinction before. Some were not in the war, but they all constituted the surgical corps of the South, and before and during the war, and for the first one or two decades after, they did practically the surgery of the South.

They were all accomplished physicians, as well as able surgeons, and with wonderful industry, learning, and art, practised successfully medicine *in its three great specialties* as laid down by Hippocrates, to wit, *medicine*, *obstetrics*, and *surgery*.

Of these noted men, because of time limitations, I can select a few only for discussion.

In those days little beyond minor surgery was done by the country doctor. And even the physicians of the larger towns and villages sent their more important cases to the cities, where the men just mentioned performed the necessary operations.

The specialties of surgery during that period were merely taking form, or being slowly differentiated, and it may be truthfully said that these men, while practising general medicine, and doing high class surgery, did much of the work now done by the specialists, and in short, helped largely to form and differentiate the specialties. They were, indeed, its true pioneers.

J. MARION SIMS

The greatest of all American specialists, the most original and creative, was Dr. J. Marion Sims, who was born in South Carolina, but reared in Alabama. To him our first President, Dr. W. D. Haggard, pays the following tribute: "I know you will sustain me when I claim that gynecic surgery, with all its brilliant achievements, owes its present exalted position to the illustrious Sims, no less than abdominal surgery owes its origin to the world-renowned McDowell. . . .

"They conferred on America the honor of being the birthplace of gynecology, and did more to alleviate the sufferings, restore the health, and prolong the lives of women than any other two men living or dead. To those who knew Sims personally he gave inspiration while he lived, and now that he is dead he has become a tradition; and his teachings, his example, and his labors have passed into history and coupled his name with the practice of an art which will illuminate the ages to come. . . .

"As one star outshines another, so it was given to J. Marion Sims to transcend all of his compeers in the glory of his achievements."

PAUL F. EVE

Another great Southern surgeon and pioneer specialist was Dr. Paul F. Eve, of Nashville, Tenn., whose achievements in daring and original work illustrate his inventive faculty, his knowledge of anatomy, his faith in the principles of surgery, his belief in himself, and his consummate skill. Of him Dr. J. A. Witherspoon says most truthfully: "No list of great surgeons and their achievements in the South would be complete without the name of that grand old surgeon, Paul F. Eve, whose character as a courteous gentleman and broad knowledge as an ethical surgeon have done so much to stimulate men to high ideals and greater surgical ambition. This grand old man contributed many things to the field of surgery.

"He was the first to make a successful hysterectomy; first to remove successfully the crista galli. It was he who first used the tendon of the deer as an absorbable suture, a lesson which made possible the catgut of today, and he was the first to relieve the deformity of the clavicle by the use of silver wire in recent cases. This, with his great reputation as a lithotomist, makes secure his fame among the galaxy of great surgeons of the past."[1]

[1] Southern Medical Journal, No. 1, vol. iii, p. 73.

Dr. Eve had conferred upon him the Presidency of the American Medical Association, and filled many important minor offices. During the absence of Professor S. D. Gross, Dr. Eve filled the chair of surgery in the University of Louisville, session 1850-51. He afterward became Professor of Surgery in the University of Nashville, and declined calls to Eastern schools, because of his preference for the South and its institutions.

He is distingusihed especially, however, as having held the office of army surgeon in two great wars. The first was the memorable final struggle of Poland for liberty in 1831. Being a student in Paris at this trying time, the wrongs and sufferings of the Poles so kindled the patriotism of his American and Republican soul, that he abandoned his studies and enlisted in the ill-fated Poland army. For this service he received the distinguished honor of the Golden Cross. His second term in army surgery was during our own civil war.

WARREN STONE

Another great name in Southern surgery is Warren Stone, who was born in Vermont. He went South at an early age, but not until he had attained distinction in the North in dealing with the great epidemic of cholera, which in 1832 ravaged Western New York, Troy, Quebec, and Montreal.

In December of the last mentioned year he landed in New Orleans with only one picayune in his pocket, and in the midst of an epidemic of yellow fever, which was followed by cholera.

The new Charity Hospital had just been built, and its wards were crowded with the sick. The young physician secured the appointment of supernumerary in the medical department of the hospital, and soon after attained the position of assistant house surgeon. He was the first appointee to this office, and in this capacity served from 1833

to 1835, in which year he was elected house surgeon, serving until 1839, at which time he became visiting surgeon, and continued in this office until 1872.

It was in this institution that most of his work in surgery was done. He was an advanced surgeon of the old school. "He taught the principles of drainage in suppurative arthritis, in hepatic abscesses, and in pyothorax. He was among the first, if not the first, to advocate the resection of the rib to facilitate drainage in suppurative pleuritis." A lecture of his on this subject it was once my pleasure to hear. In the surgery of aneurysm he was most expert, and devised some operations, which with his achievements in lung surgery gave him fame.

He was, perhaps, the first to introduce the silver ligature, which he used successfully in the ligation of the common iliac artery. His reason for using silver was because of its "innocuous character," which statement in 1852 was one of the prophesies of aseptic surgery.

He retired from active work in 1872 because of failing health, and died soon after, at the age of sixty-four.

W. T. BRIGGS

W. T. Briggs, of Nashville, Tenn., is another name of note. He was born in Bowling Green, Ky., December 4, 1828. He graduated from the Transylvania University in Lexington, Ky., in 1848. He was made demonstrator of anatomy in the University of Nashville in 1852, in which year he had removed to that city. He was one of the founders of the American Surgical Association, and was its President in 1885. In that year he was chosen President of the surgical section of the International Medical Congress, which was held in Washington in 1887. He succeeded Paul F. Eve to the chair of surgery in the University of Nashville, Tenn.

He took a hand in all things promotive of surgery. He

was a great lithotomist. Through his work as a practical surgeon and his writings, he achieved a commanding place among the surgeons of the South.

He once told me that he believed he owed his success and name as a surgeon to a grewsome surgical failure. At the time he was a young doctor practising in a large country town. A man had sustained a fracture of the thigh bone, and Briggs was called to dress it. The result was a hideous deformity, which seemed to parade itself before him on all occasions. He could never go out to make a call or take a walk for fresh air, that this testimonial to his bad surgery, or bad luck, was not either sitting on some veranda with his leg askew, or hobbling about the town with crutch or cane. Not more certainly did the satire of Robert Burns drive Dr. Hornbook out of Tarbolton Parish than did this hobbling, limping, living surgical satire drive Dr. Briggs out of Bowling Green, Ky.; but with this difference: Hornbook took to drink, while Briggs took a strong grip on surgery, and scaled the heights of fame's dread mountain.

HUNTER HOLMES MC GUIRE

Hunter Holmes McGuire was born in Winchester, Va., on October 11, 1835. His father was Dr. Hugh Holmes McGuire, who "was a physician and surgeon of the older type," and was famous in all the region west of the Blue Ridge Mountains. He was an all-round surgeon, but gave special attention to the eye. His success in the surgical treatment of its diseases and deformities brought him many patients from near and far, and justly entitled him to be called a pioneer, if not the first, in America to practise ophthalmology.

Dr. McGuire's mother was Ann Eliza Moss, of Fairfax County, Va., a descendant of Col. Joseph Holmes, officer in the Continental line. Dr. McGuire received his literary education at Winchester Academy, and later pursued his

studies at a medical college in his native town, and at the medical schools of Philadelphia.

From 1856 to 1858 he was Professor of Anatomy in the Medical College of Winchester. At the close of the latter year he went to Philadelphia to conduct a quiz class in conjunction with Pancoast and Luckett. It was during his sojourn in Philadelphia that the John Brown raid took place at Harper's Ferry. This incident or episode so wrought upon the sentiments of the many students of Southern blood in Philadelphia at that time, that young McGuire, then twenty-four years of age, induced three hundred of them to secede from the schools in Philadelphia and follow him into the South. This was a presage of trouble to come, small, indeed, but quite as significant as the action of South Carolina in deserting the Union and firing the first gun upon Sumter.

In this act the young medical student gave evidence of what afterward was fully realized in his conduct during the war, that he was a born leader of men.

After a sojourn of something like two years in New Orleans, he returned to his birthplace in Virginia, and soon after entered the service of the Confederate Army under Stonewall Jackson, who made him his medical director.

Dr. McGuire at this time was not more than twenty-seven years old, a youth, hardly a man. "To his sense of just proportion this distinction appeared to be unfair to others of his profession, who, older and more experienced than himself, had from like motives entered the service. He pointed this out to General Jackson, and asked to be relieved, but his only solace was the stern reply: 'Sir, I appoint you.' And from that day on, till the 'Dolorous Stroke' at Chancellorsville, there was no official report of a battle by General Jackson that did not contain express acknowledgment of the efficient service of Surgeon McGuire."[1]

[1] Hunter McGuire oration, delivered by the Hon. Holmes Conrad at the unveiling of the statue to his memory in Richmond, Va., January 7, 1904.

In after years, when crowned with honors, he used to say, with characteristic modesty: "The noblest heritage I shall hand down to my children is the fact that Stonewall Jackson condescended to hold and to treat me as his friend." The surgical skill and masterful ability which Dr. McGuire displayed during his service in the war fully justified the estimation and esteem in which General Jackson held him.

"He humanized war by originating the custom of releasing all medical officers immediately on their capture." To him belongs the credit of organizing the "Reserve Corps of Hospitals of the Confederate army, and in perfecting the Ambulance Corps."

At the close of the war Dr. McGuire settled in the city of Richmond, where he held the chair of surgery in the Medical College of Virginia until the year 1878. In 1883 he founded St. Luke's Home for the Sick, with its attendant "training school for nurses," which remains another monument to his wise sagacity and pious zeal.

In 1893 he was one of the founders of the University College of Medicine, in connection with which was established the Virginia Hospital. Of each of these institutions Dr. McGuire was President, and in the college was Clinical Professor of Surgery. He was also one of the founders of the Medical Society of Virginia, which was orgainzed in 1870. In 1880 he became its President.

"His chapter on the treatment of gunshot wounds found a place in the standard works of his profession and obtained ready acceptance by the masters of surgical art the world over." He received many decorations, honorary degrees, and preferments. The inscription upon the monument which was unveiled with fitting ceremony in Richmond on January 17, 1904, pays just tribute to his worth as a physician, a surgeon, a citizen, and a man.

" To Hunter Holmes McGuire, M.D., LL.D., President of the American Medical and of the American Surgical Association; Founder of the University College of Medicine; Medical Director

of Jackson's Corps, Army of Northern Virginia; an Eminent Civil and Military Surgeon and Beloved Physician; an Able Teacher and Vigorous Writer; a Useful Citizen and Broad Humanitarian; Gifted in Mind and Generous in Heart; This Monument is Erected by His Many Friends."

We all knew him. He was the second President of this Association, and truly its most eminent incumbent. Excepting the names of Jackson and Lee, no name was more reverenced by the Southern soldier and army surgeon, or more deeply fixed in the heart of the Southern people.

SAMUEL D. GROSS

When the great critic Taine, in his discourse upon "The Writers of the Renaissance," came to consider Shakespeare, he wrote: "So now at last we are in the presence of one whom we perceived before us through all the vistas of the Renaissance, like some vast oak to which all the forest-ways converge. In order to take him in completely, we must have a wide and open space. He needs no praise, but comprehension merely; he can only be comprehended by the aid of science."

Without hyperbole the foregoing may be said of the great master surgeon, Samuel D. Gross. Though most of his work was done in the East among Eastern and Northern surgeons, it must not be forgotten that much of it was done in Louisville, in whose University he held the chair of surgery for more than fifteen years.

I shall not attempt a biography of this most distinguished man, whose life, and whose achievements have been recited by masters in history and biography, and whose work belongs to the world. I shall try only to sketch his noble figure as we see him glory crowned adown the vista of a century.

He was born in Easton, Pa., in 1805. At the age of six he conceived the idea of becoming a physician. He was true to his purpose, and from that time until he was gathered in

like a full shock of corn, at the ripe age of seventy-nine, he was true and unswerving to his purpose.

Of this he says: "If I was not a born doctor, I was determined from my earliest boyhood to study medicine, and although I have sometimes thought I had mistaken my calling, I am not sure but that I have done well in being a doctor, and living by men's diseases." After securing some preliminary education in the schools of his native town, and in the high school at Lawrenceville, N. J., he studied for a year with a preceptor, and in 1826 entered the Jefferson Medical College of Philadelphia, from which he graduated in due time. It is a significant fact that his thesis on this occasion was on the Nature and Treatment of Cataract.

He settled in Philadelphia. He encountered the usual discouragements of the young practitioner, but was able to secure bread and pay office rent by doing literary work. Having acquired some knowledge of French in his school days, he translated a work on *General Anatomy*, by Baily and Holland, of Paris, just fresh from the press. He accomplished this work in two months' time, for which he received the sum of two hundred dollars. Later he translated Hatin's *Manual of Obstetrics*, for which he received seventy-five dollars. A copy of this book was sent with a polite note to the famous Dr. William T. Dewees, Professor of Midwifery in the University of Pennsylvania. Dr. Dewees did not acknowledge the courtesy, but said to a friend that while the author *might* be a promising young man, the faculty of the University would take no notice of anything that emanated from the Jefferson School. Truly history has repeated, and still repeats itself. With two more essays in the field of translation, Dr. Gross abandoned it and turned his attention to original work.

His first was *The Anatomy, Physiology, and Diseases of the Bones and Joints*. This was published in 1830, and is truly a remarkable achievement for a young man of twenty-five. The edition reached two thousand copies. The work was

never reprinted. He says he "labored day and night under the stimulus of both ambition and poverty."

In the fall of 1833 Dr. Gross became Demonstrator of Anatomy in the Ohio Medical College, in which office and as lecturer on Surgical and Visceral Anatomy he "laid the foundation for the practical study of anatomy, which up to that time was a nominal matter in the Western States." He was also one of the editors of the *Western Medical Gazette.*

In 1835 he was made Professor of Pathological Anatomy in the medical department of the Cincinnati College of Medicine, which was organized in that year.

In 1840 Dr. Gross was elected to the chair of surgery in the Louisville Medical Institute, which afterward became the University of Louisville.

Dr. Gross began his work as Professor in Louisville under most discouraging circumstances. Joshua B. Flint, the former incumbent, had been ejected. Flint had many friends in the college, and in the profession of the city, who turned upon Gross their batteries of abuse. He took no notice of this, and following faithfully the line he had marked out for himself, soon forged his way to the front. It is a tradition of the University of Louisville that Gross' first lecture on surgery in this school was upon "Stone in the Bladder," which he illustrated by a lithotomy upon a living man before the class. It seems that Flint not long before had attempted the operation and failed to extract the stone. Gross, after some pertinent remarks on what he was about to do, extracted the stone *tuto, cito,* if not *jucunde,* and waving it aloft in the forceps before the class, said triumphantly, "When I *cut* for stone, I *get* the *stone.*" The applause was tremendous, several hundred voices joining in the chorus.

As I have said, though a large part of Gross' work was done in the East and the Southeast, much of it was done in Louisville, where he taught and lectured, and practised medicine and surgery for about fifteen years. Of his great work, *A System of Surgery,* he says: "The work is founded upon the

courses of lectures which devolved upon me to deliver during the last forty-two years. First in the University of Louisville, and later in the Jefferson Medical College of Philadelphia." The first edition was issued in 1859. It was hailed by physicians and surgeons the world over as the greatest work of its kind ever performed, and went rapidly through six editions.

Of Gross' original contributions to surgery I can say little at this time. They were many, and are well known to us all. Like all men of genius, he thought and wrote ahead of his time.

In 1843, writing of knife wounds which penetrate or divide the gut, he advised that the external wound be widened sufficiently to admit the surgeon's hooking up the injured bowel, and after closing the openings to carefully remove effused matter with tepid water and the sponge. Dr. Gross arrived at this conclusion after making experiments upon dogs, and so may be considered the originator of what long years afterward became a classic procedure in surgery.

In 1883, just forty years after the prophetic utterance of Gross, I operated successfully upon a man who had received a knife wound in the abdomen. The instrument had penetrated the small intestine, making two wounds in it. The details of this operation were published in the *American Practitioner*, 1884, vol. xix, No. 169, where due credit is given Dr. Gross for suggesting the operation. Relative to this Sir William McCormack in the annual oration on "Abdominal Section for the Treatment of Intraperitoneal Injury," before the Royal College of Surgeons, London, 1887, refers to my paper with the following remarks:

"Dr. W. O. Roberts, of Louisville, reports a case which shows how much can be done, under unfavorable circumstances, in wounds of the intestine. It is, I believe, the first successful case of the kind in America, and well illustrates the practice we should adopt." In closing my paper I wrote: "What Dr. Gross suggested more than forty years ago as

applicable to knife wounds of the gut has been, as is well known, recently widened so as to embrace all penetrating injuries of the bowel; but the honor belonging to the entire procedure is now claimed by others. I submit that it belongs to Dr. Gross."

The surgeon who surveys Gross' masterpiece, *A System of Surgery*, with its more than two thousand pages, royal octavo, in long primer, and its fifteen hundred or more woodcuts, illustrating every operation and pathological condition to date, stands in awe and admiration at the marvellous erudition here displayed, and the genius and industry of the man who could conceive of and complete such a work. It is true that it represents the study and labor of something like forty years, but when we take into consideration the fact that Gross was always a busy practitioner both in medicine and surgery, the occupant of a chair in a medical school which consumed much of his time, and engaged in the preparation and composition of numerous papers, monographs, and minor treatises in surgery, the time would seem all too short for the production of such a colossal work. Gibbon's *Decline and Fall of the Roman Empire* is not more truly the noblest monumental achievement in history than is Gross' *System of Surgery* the crowning work of surgical authorship. He was the Hippocrates of modern medicine.

DAVID WENDELL YANDELL

Another conspicuous figure in the surgery of this epoch is David Wendell Yandell. He was born on September 4, 1826, at Craggy Bluff, six miles from Murfreesboro, Tenn. His grandfather, Dr. Wilson Yandell, was a noted physician of his time, and if tradition may be trusted, was probably the first surgeon in America who did a laparotomy for the relief of volvulus or intussusception. His father was Dr. Lunsford Pitts Yandell, "a scholar, a teacher, an orator, a writer of

grace and power, a connoisseur in art, and a savant in science. To David descended the ancestral gifts in measure full and overflowing. In him was the culmination of the genius of the Yandell family."

Dr. Yandell's boyhood was passed, and the foundation of his education was laid in Lexington and in Louisville, where his father lived, and practised, and taught. In 1846 he graduated in medicine from the University of Louisville, and made his first tour to Europe, where he studied medicine in the great schools of Paris and London. His letters at that time were published in the *Louisville Journal*, edited by Geo. D. Prentice, and in the *Western Medical Journal*, edited by Drs. Daniel Drake and L. P. Yandell, Sr. They attracted wide attention and elicited hearty encomiums from many, and especially from Prentice, who in those days was the dominant editorial genius of the South. Dr. Yandell showed not only talent for writing a mastery of English, but a faculty for observation and a sympathy for human life truly remarkable in a boy of less than twenty summers, and these characteristics were marked through a long, useful, and brilliant career. A brief quotation from Yandell's presidential address before the American Medical Association in 1871 well illustrates his style as a writer, his sympathy with humanity, and his appreciation of his chosen profession with its beneficent influences:

"While returning from California a year ago, in company with a number of friends now present, the train stopped in the heart of the Rocky Mountains at a water tank, about which had been built by laborers and miners a few frame shanties. A man in the garb of a miner entered the car and asked if some physician on the train would not step over to his home and see a sick child? I went with him. The patient was a litttle boy suffering with some head trouble following measles. He was being calmed during the day by the bromide of potassium and soothed to sleep at night by the hydrate of chloral. In the pine-board hut hard by, occupied as home and office by the doctor of the settlement,

lay a medical journal of the current month, from the pages of which he gathered the latest utterances of the masters and the newest therapeutic discoveries of the day. There in those mountain fastnesses, among the rude people, a thousand miles removed from the haunts of civilization, where in his lonely rides he saw more antelopes than fellow men and heard oftener the shrill yelp of the coyote than the voice of a friend, this hardy pioneer in our art rendered to the sick boy of the miner the same succor that was given by his more fortunate brother to the greatest and richest denizens of the cities, to the very princes of the earth themselves."

Dr. Yandell was in every sense a man of the world. No one knew better than he how to ingratiate himself with everybody from the highest to the lowest, from state, and literary, and scientific celebrities of the new and old world, to the boy who blacked his boots in the hotel or tavern, or the girl who passed him his food in the country log cabin on the hill slope or by the brook. If he had been a lawyer, he would have held high place among the statesmen of his country. He was a great hunter, and his rambles with dog and gun were taken in almost every State in the Union. Of him the Hon. Henry Watterson said: "Dr. Yandell was an undoubting and unflagging hunter for all game, from the homely quail to the grizzly bear himself."

He was a most charming conversationalist, an orator of great power, and a wit who would have been famous had literature been his calling.

Shall I give you a specimen of this wit? In a letter to Dr. Theophilus Parvin, his editorial partner, wherein he describes some incidents pertaining to the dinner which was given in Philadelphia in 1879 in celebration of the fifty-first anniversary of the entrance into the medical profession of Dr. Samuel D. Gross, he writes:

"Professor Agnew took the chair at eight o'clock. A moment before he took away my appetite by telling me that I was expected to reply to a toast. A timely notice that one

is to get on his legs is allowable. No notice at all until you are called on is even better; but to knock the epigastrium entirely out of a man just as he takes his seat to fill the aching void left by a two days' journey, is a coarse cruelty which should be inflicted on no man. It turns bread to stone and converts the meat into a serpent. Don't you remember the group of unhappy-looking people you've seen at banquets; the men who ate nothing and drank less, and with whom you couldn't, no matter what effort you made, keep up a talk, who wouldn't listen to you, and who gave you no opportunity of listening to them; the gloomy-looking chaps who seemed to wish they were at home in their little beds? Well, they are the men expected to speak, and who have been told so just as they took their seats." So much for wit.

He was an orator. The following, from an address delivered at the dinner named, bears testimony to his eloquence. The words are in response to a toast to Kentucky and Kentuckians:

"I feel, Mr. Chairman, that it is an honor to be called on to speak on such an occasion and for such a people—a people who have given to statesmanship a Clay, a Lincoln, and a Breckinridge; to arms a Johnston, a Preston, and a Buckner; to surgery a McDowell and a Dudley. A goodly company! Stately names! Would you think me as exceeding the limit of good taste if I added, and chief among all these is that of him who bears the mark of our guild, Ephraim McDowell? For, sir, will not the labors of the statesman give way to the pitiless logic of events, the voice of the orator grow fainter in the coming ages, and the deeds of the soldier eventually find place but in the library of the student of military campaigns, while the achievement of the village surgeon, like the widening waves of the inviolate sea, shall reach the uttermost shore of time, hailed of all civilizations as having lessened the suffering and lengthened the span of human life?

"Again, would you think me very far wrong were I to couple the victorious issue of the late war and the operation of ovariotomy as in different fields the two most stupendous events of modern times? Sir, both are to be credited to Kentuckians.

"Mr. Lincoln effected the one, and Dr. McDowell accomplished the other. Nor yet, in my opinion, do the two achievements admit of comparison. Powerful cabinets, far-seeing ministers, renowned captains, a daring and multitudinous soldiery, a rich, a steady, a united, and a persistent people contributed to the success of the former. Its glory was won amid the blaze of trumpets, the groans of men, the shock of contending armies. The glory of the other belongs to but one man, is single and indivisible, was won amid the smiles of fair women, and by the cunning of a single hand, which, unaided and alone, plucked victory from an enemy which, before McDowell's time, had defied all that was subtlest in art and repulsed every assault of science."

Dr. Yandell was the founder of the *American Practitioner*, which began its existence in 1870, and held prominent place in the medical literature of the South for more than sixteen years. He was elected President of the American Medical Association in 1871. In 1879 he made his second tour to Europe, where he was honored by many of the great surgeons and physicians of the old world, and was made a fellow of the London Surgical Association. In 1886 he was elected fellow of the Philadelphia College of Medicine. In 1887 he was appointed Surgeon General of the troops of Kentucky. In 1889 he became President of the American Surgical Association.

Dr. Yandell as a young man followed the calling of general medicine in Louisville, where he did a large practice, and won for himself much repute as a teacher of his art. It was at this time that he instituted Stokes' Dispensary, which entitles him to the honor of being the first to establish clinical teaching in the West. His clinics were conducted privately in a

little room on Green Street, but soon after he was appointed to the chair of clinical medicine in the University of Louisville.

The Civil War was now upon the country, and Dr. Yandell entered the Southern army. He was taken from the commands of Generals Buckner and Hardee by General Albert Sidney Johnston, who made him medical director of the Department of the West. He held this office until the close of the war, serving on the staffs of General Beauregard, Hardee, Joseph E. Johnston, and E. Kirby Smith. He was in the battles of Shiloh, Murfreesboro, and Chickamauga. "He was always a soldier of soldiers, calm and brave in the face of danger, and unflinching in duty. His department was admitted to be the best ordered in the service."

At the close of the war Dr. Yandell made a master-stroke in the role of peacemaker.

"A meeting of the American Medical Association was appointed to take place in Cincinnati in 1865. Between the victorious Unionists and the conquered Confederates the feeling was intense and bitter. The gap of friendship, already wide, was widening. Dr. Yandell took the initiative in 'shaking hands over the bloody chasm' with the Northern medical brethren. In a noble peace-making speech, wherein he nominated his 'great master,' Dr. Gross, for the presidency, he carried the day for harmony. Hatred was deposed and brotherly love enthroned."

Dr. Yandell held the chair of the Science and Practice of Medicine in the University of Lousiville from 1867 until 1869, when he was made Professor of Clinical Surgery. As a surgeon he was preëminent. No man of his time did better or higher class work. He was a careful reader of home and foreign journals, and was always abreast with the times. His operations were characterized by a scrupulous cleanliness, which in post-bellum days was a prophecy of the since great triumphs of aseptic surgery. But it must not be forgotten that he was an all-around man, and throughout his long and brilliant career practised medicine as well as surgery. He

was not only *facile princeps* in surgery, but he was a physician and obstetrician of the highest order. He was apt in diagnosis, he knew the natural history of disease, and in the art of therapy he displayed rare judgment and sound common sense. The maxim,

> "Be not the first by whom the new is tried,
> Nor yet the last to lay the old aside,"

was made for him.

He never followed fads, while quack and proprietary medicines, with their etymologically tortured names and doubtful constituents, had no charm for him, yet he never fell into the desuetude of therapeutic prejudice or old-fogyism.

Dr. Yandell composed no systematic work in surgery, but he was a frequent contributor to the medical journals of the country, and occasionally published articles in literary magazines. His addresses, editorials, letters, scientific and literary articles, if gotten together and well edited, would make a large and interesting work of several volumes. His style was terse, condensed, always to the point, and often rose to eloquence, if not to poetry.

His last appearance in public was the occasion of the delivery of the Doctorate Address of the Medical Department of the University of Louisville in 1892. This was his last contribution to medical literature. It was upon the subject of "Temperament." It is full of beauty and powerful reasoning. He who reads it cannot fail to see in it "the sage," the philosopher, the scholar, the teacher, and the philanthropist.

His death was caused by arteriosclerosis.

Dr. Yandell was the pupil and beloved friend of Samuel D. Gross. He crystallized his master's memory in perhaps the greatest epitaph that was ever written. Of this friendship between the pupil and master it was aptly and eloquently said:[1] "This epitaph engraved upon the tomb of Gross will

[1] American Practitioner and News, April 15, 1899. Address by Professor Henry A. Cattell, M.D., The Life and Character of Professor David W. Yandell, M.D., LL.D.

stand as long as fame shall weave garlands for that immortal brow. Master and pupil were lovely and pleasant in their lives; let us hope that in their death they are not divided; for of them it may be said with far more reaching truth than of Saul and Jonathan, 'They were swifter than eagles; they were stronger than lions.' "

EFFECT OF THE WORK OF THESE PIONEERS UPON MODERN MEDICINE

The pioneers of surgery had no well-ordered operating rooms, and their successors, the surgeons of ante-bellum and post-bellum times had no laboratories to back or supplement their work. Gross, Yandell, McGuire, Stone, et al., until Koch and Pasteur came to the front, knew nothing of the Streptococcus or Staphylococcus pyogenes aureus and albus, no Bacillus pyocyaneus fœtidus, tubercle bacillus, plasmodium malariæ, treponema pallida, nor any of the thousand and one microörganisms, vegetable and animal, with unpronounceable names, and malignant affinities for the flesh of man. And yet it may be said, without disparaging the splendid work which the laboratory has done, for surgery much, and for medicine more, and which made Lister famous, and Listerism the Shibboleth of modern surgery, these masters had a learned and rational pathology under the teachings of Rokitansky and Paget, and achieved results which have made possible the brilliant work of their successors today.

THE FATE OF FAME

Encomiums upon the lives and characters of the worthies I have named would be superfluous, were it not that calling up afresh from time to time the doings of such may tend to preserve their names and perpetuate their fame. Many who live today know personally the worth of some of them, and will leave traditions of their lives and work as a heritage to

their children. Medical books and authors are short-lived and doomed to oblivion. A man's name, however, may be preserved for many years through footnotes in books pertaining to his calling, or some disease or operation which he discovered or devised, and was made to stand sponsor for. But while philosophers, poets, heroes, and conquerors have place among "the few," "the immortal names" that were not born to die," it is doubtful if even the eminent physician or surgeon will have any secure hold upon posthumous fame. His memorials may have been trusted to a book that has long since gone the way of "fools to dusty death." A paper or a chapter in a tome long forgotten, or a paragraph in a cyclopedia which in time some too discriminating editor may deem it his duty to scratch.

Sic transit gloria mundi is true of the individual as of the world! These our noble predecessors, with perhaps two or three exceptions, will descend into the limbo of all but the elected few; but they have the *monumentum aere perennius* in their work which is a priceless heritage to us all, and shall go down through the generations to the end of time, prolonging the life and promoting the happiness of man!

THE IMPORTANCE OF PRESERVING THE GALL-BLADDER IN OPERATIONS ON THE GALL PASSAGES

By John Wesley Long, M.D.
Greensboro, N. C.

Before taking up my subject may I be permitted to say that it gives me much pleasure to read the opening paper on this occasion. However, the pleasure is mingled with a tinge of sadness because of the fact that of the ninety-seven men who organized this Association as the result of a meeting held in this city in September, 1887, when Dr. W. D. Haggard, Sr., now of sainted memory, was elected our first President, only a baker's dozen remain. In the name of this remnant of the "Old Guard" I address you today.

The object of this paper is to emphasize the importance of retaining the gall-bladder whenever it is possible to do so.

In the upper part of the abdomen the gall-bladder is the surgical landmark. From this innocent-looking side-pocket we must take our bearings always. In making the diagnosis, it matters not whether the lesion be ultimately found in the duodenum, stomach, liver, pancreas, or elsewhere in the neighborhood, our perspective of the situation is neither clear nor comprehensive if we fail to include the gall-bladder in the field of vision, and in differentiating convict or exclude it from complicity in the morbid process.

Just in the proportion that we give the gall-bladder the first consideration will its importance manifest itself. The

more one operates the more he realizes the preëminence of this organ in its relation to its correlated group.

When we remember that more than ten times as many operations are done on the gall-bladder as on all the other organs in this region combined, the foregoing assertion can scarcely be questioned.

Following the first cholecystectomy by Langenbuch, in 1882, and observing the ofttimes brilliant results obtained, surgeons were quick to adopt the method of extirpation in preference to drainage. Not only cases with positive indications were subjected to cholecystectomy, but those on the border line, and in many instances cases that we know today would have done quite as well or better with a cholecystostomy. In the presence of the stones and their infected container, surgeons seemed to lose sight of the function and therapeutic value of the gall-bladder. I confess that formerly I taught that cholecystectomy was ideal, therefore the operation of choice, getting rid at once of an infected, obstructed organ, as well as the irritating stones. A critical analysis of 86 of my own operated cases, 20 of them done this year, has led me to think differently, so that my present custom is to never remove the gall-bladder unless the conditions present appear to make it imperative.

The circumstances under which a cholecystostomy would better conserve the interests of the patient may be best understood by first discussing briefly the indications for cholecystectomy.

In the presence of a newgrowth, particularly primary carcinoma not yet advanced too far, no one would think of anything else than extirpation. In the abundance of precaution it is also a wise practice when doing cholecystostomy to snip out a piece of the gall-bladder for the microscope, for fear an unsuspected carcinoma may be present.

If the whole thickness of the bladder walls be gangrenous, there is no other course to pursue than to remove it. However, on several occasions I have been able to preserve the

gall-bladder where the mucosa was frankly gangrenous, with the muscularis and serosa in the earlier stages of the same process, by doing cholecystostomy; the mucosa sloughing away and restoration taking place in the other layers.

An enormously dilated gall-bladder, when infected and ulcerated, especially if dislocated, should be extirpated. I have one such bladder half as large as the stomach in my collection. Perhaps the degree of infection, the ulcers, and position rather than the size determined me in this instance.

Empyema of the gall-bladder is a relative indication for cholecystectomy. Here again the intensity of the infection, not forgetting the involvement of other organs, must help to decide the question.

The presence of the empyema presupposes closure of the cystic duct. Formerly I felt that if there were no bile in the gall-bladder the obstruction of the cystic duct was complete and hopeless, but I have come to realize that removal of the stones and septic fluid with drainage will, as a rule, restore the patency of the duct. On adopting cholecystostomy in preference to cholecystectomy in this class of cases, I was at first disturbed because the bile did not begin to flow at once or within a few hours. As experience accumulated, however, I noticed that the discharge of bile was established only after a varying interval, often from three to seven days, in one case on the fifteenth day. It would seem that the closure of the duct is due not only to the presence of the stones, but to swelling of the duct mucosa, just as the hypertrophied mucosa of the turbinates closes the nostrils. It should be set down, as a rule, that in most instances the atresia of the cystic duct is apparent rather than real. Surgeons have been slow to recognize this fact, which once admitted removes empyema from the list of positive indications for cholecystectomy.

It must be rare indeed that a stone impacted in the cystic duct justifies extirpation of the bladder. I have never failed to dislodge the stone except it be in a case like the

following, in which years before the gall-bladder had emptied itself into the stomach and the cystic duct and bladder were reduced to an impervious cord, literally crushing the imprisoned stones into the tissues. Drainage had to be made direct from the common duct, which, with the hepatic duct and its various branches, was filled with soft putty-like stones. Lesser grades of tissue destruction from stone impaction do not call for extirpation of the bladder.

Wounds of the gall-bladder are usually considered an indication for ablation. However, unless the trauma is very destructive, it is better to drain, for two reasons; first, because drainage preserves the gall-bladder; and secondly, the fear of normal bile which may escape into the abdomen producing peritonitis is unfounded.

Even perforation from ulceration should not be considered an absolute indication for cholecystectomy. Only recently I drained a bladder that was perforated and most of the fifty stones had escaped into the liver. The patient had been having rigors and high fever. Prompt recovery followed.

In another instance three square stones, one-half inch on each facet, had ulcerated their way through the side of the gall-bladder and into the common duct. Drainage of the common duct and the gall-bladder brought about perfect recovery. Five years later I opened the abdomen of this same patient to remove the appendix, and was astonished to see how nearly normal the gall-bladder and ducts were. In fact there was no occasion for questioning their function.

There are, perhaps, other indications for cholecystectomy, but these are the most common.

THE VALUE OF DRAINAGE: THE ESSENCE OF CHOLECYSTOSTOMY

Drainage is second in importance only to removal of the stones, in fact, more so under some circumstances. For instance, removing stones cannot cure a pancreatitis, drain-

age does. There is no organ in the body, not excepting the Fallopian tubes, that being once badly damaged responds more effectually to drainage than does the gall-bladder. It has already been stated that acute infection, empyema, gangrene, obstructed cystic duct, and even perforation may be overcome by drainage.

Moynihan[1] says: "One point cannot be too frequently or too strenuously emphasized, that is, that drainage is the secret of success in gall-bladder surgery."

But over and above the value of drainage to the bladder itself, drainage is the sine qua non for curing the patient of the wide-spread sequelæ of the gall-bladder infection. This is best done through and around the gall-bladder. True, the liver and pancreas may be drained through a tube in the common duct, but never so safely and certainly only for the time being.

So important is drainage that when it becomes necessary to do a cholecystectomy it is a safe precaution to leave forceps instead of a ligature on the cystic duct in order to be able to open the duct and allow a free flow of bile should untoward symptoms develop.

If there were no other reason for retaining the gall-bladder whenever possible, its intimate anatomical and physiological relations to the pancreas would be sufficient justification. Embryologically it was probably a wise provision to develop so necessary an organ as the pancreas, like the uterus, from two separate points; one bud arising from the posterior wall of the primal tube and the other from the anterior wall in connection with the gall-bladder outgrowth. At first the posterior bud is the more vigorous, developing a large duct (Santorini), but soon the anterior bud forges ahead and fuses with its twin, becoming the main portion with its larger duct (Wirsung). As the gall-bladder and pancreas develop and recede from each other, only their ducts remain united,

[1] Gallstones and their Surgical Treatment, Moynihan, p. 354.

but in such a manner that the function of each organ is in a sense blended with that of the other. Surely such relations mean something.

The gall-bladder has long since ceased to be regarded merely as a storage-pouch for bile. The disparity between its capacity and the amount of bile secreted daily is proof of this. Rather should it be considered the *expansion-tank* for the bile-duct system. It has been frequently observed in cases where the gall-bladder had long since been destroyed, and following removal of the gall-bladder, that there was a marked dilatation of the common and hepatic ducts; even the little nub remaining of the cystic duct dilates, the dilatation compensating, as it were, for the loss of the expansion-tank.

Experimental physiology has demonstrated, curiously enough, that pure bile injected into the pancreatic duct will cause fatal pancreatitis (Opie[1]), while mucus from the gall-bladder mixed with the bile greatly modifies its toxicity (Flexner[2])—a cogent reason, it seems to me, for preserving this function of the gall-bladder.

It is interesting to note in this connection how often pancreatitis occurs when the functions of the gall-bladder are held in abeyance by disease. We are all familiar with this picture. Under date of December 2, 1910, W. J. Mayo[3] writes: "We have made 3870 operations on the biliary tract, and 7 per cent. of the total had pancreatitis, and 24 per cent. out of 469 operations on the common duct had pancreatitis."

This large percentage of pancreatitis complicating diseases of the bile duct system is perhaps the strongest reason that could be advanced for preserving the gall-bladder. What other means have we of dealing with a chronic inflammation

[1] Diseases of Pancreas, Opie, 1903, p. 30.

[2] Contributions to Medicine, Dedicated to Wm. H. Welch, Flexner, 1901.

[3] Personal letter from Dr. Mayo.

of the pancreas? And how truly wonderful are the results! I would like to ask how many surgeons present, after feeling of an enlarged, nodular pancreas marked the case "doubtful," and were surprised to see a perfect recovery ensue under the beneficent influence of drainage. Only a little while ago I drained a perfectly normal bladder because the patient had a chronic pancreatitis, with the most satisfactory results.

Drainage is not only essential for the pancreatitis already present, but who knows when a healthy pancreas may become diseased, therefore it is pertinent to retain this avenue of approach. Mayo says, "I quite agree with you that the gall-bladder should be saved wherever possible."

I might add that there are other occasional conditions, such as irremovable obstruction at the duodenal end of the common duct, or, indeed, any condition which would justify the operation of cholecystenterostomy—all of which are additional reasons for preserving the gall-bladder in operations upon the gall passages.

DISCUSSION

Dr. Thomas S. Cullen, of Baltimore.—We are to be congratulated on the paper just read by Dr. Long. It sums up the pith of the subject, namely, drainage instead of removal of the gall-bladder in nearly all cases. We have for several years made it a practice to drain all gall-bladders except where, as the doctor said, there is a suspicion of malignancy, or where there is an empyema of such a character that it would be impossible to drain satisfactorily. In the latter cases the danger of removing the gall-bladder would not be as great as the danger from the infection.

Dr. Howard A. Kelly, of Baltimore.—I would like to review categorically my own observations in regard to this subject. Under no circumstances would I remove a gall-bladder which is apparently sound, or even moderately diseased, which might easily recover with drainage; nor would I, even in a bad case, with much thickening, think of removing the gall-bladder unless the patient was in the best possible condition and the operation could be concluded without any great technical difficulties. Under no circumstances should a gall-bladder be removed where

there is any suspicion of trouble in the common duct or any pancreatic disease. In pus cases, or in cases attended with empyema, we would like sometimes to remove the gall-bladder, but sometimes we can get the same effect by cleaning it out very carefully, sterilizing and thoroughly scraping out the interior, detaching its mucus interior, removing its lining from the encapsulating tissues, and then it will close as effectively as if drained. It is best to remove a gangrenous gall-bladder or one suspected to be malignant.

I wish some of the members would tell us what they do in those cases in which there are long pendulous gall-bladders which bend over and kink. In such cases I have been in the habit of resecting or making a partial ablation.

Dr. J. Garland Sherrill, of Louisville.—With reference to the question mentioned by Dr. Kelly, I think it was Dr. Vance who resected a portion of the gall-bladder, scraped the mucosa, and treated it as we do any simple organ.

I wish to commend Dr. Long's paper. It is timely. There has been a tendency to do too radical operations in this region.

There is one point I would criticise a little, and that is in leaving the mucosa which is gangrenous in the gall-bladder, allowing it to slough out. The point made by Dr. Kelly of scraping out the mucosa is much safer. I have seen a number of gall-bladders full of pus, which seemed to be entirely obstructed. The reparative power of the tissues is very great, and the opening becomes patent in a short time, and drainage of bile becomes free. I recently discharged a patient in whom at operation it seemed likely that a flow of bile would not be obtained. Finally, bile appeared, and the patient has recovered and is happy.

Dr. Randolph Winslow, of Baltimore.—On the contrary, what Dr. Sherrill has just said does not always occur. I recall a case upon which I operated some time ago, where the duct was evidently obstructed; although bile appeared, it did not flow freely, and in the course of time nothing but mucus came from the external opening; the gall-bladder was distended, and bile did not come. In other words, there was stricture of the cystic duct, which necessitated a second operation of removal of the gall-bladder. That takes place more frequently perhaps than we have imagined.

I do not know whether we are ever going to be able to settle the point of when and when not to remove the gall-bladder. Each surgeon will use his own judgment in such cases, and if the gall-bladder appears to him to be better if taken out, he is liable to do it. As a general proposition, everybody will agree that it is bettter to preserve the gall-bladder. If, however, the gall-bladder is greatly thickened and rigid, there is

a strong possibility that it may be malignant. I do not take much stock in Dr. Long taking out a part of the gall-bladder for examination. The piece he takes out may not be the one that is cancerous. I do not believe that is the right method of making a diagnosis. If the gall-bladder is diseased to such an extent that there is a probability it will not be restored *ad integram*, it is better to remove it.

Dr. R. E. Fort, of Nashville.—With reference to one statement made by Dr. Kelly, who says that he invariably drains the gall-bladder, does a cholecystotomy instead of a cholecystectomy in the presence of common duct obstruction, I will say, of course, that is the rule, but I do not suppose Dr. Kelly intended to include those cases where we have a small, contracted, rigid, friable gall-bladder not larger than the finger, in which drainage cannot be instituted, and in such cases I think it is not only proper, but essential to do a cholecystectomy, and the general trend of my own thought is with Dr. Long and Dr. Kelly that wherever it is possible to do a cholecystotomy we should do so instead of a cholecystectomy, not only for the reasons stated, but because there is a fractional per cent. difference in the mortality. We have a smaller mortality, something less than 1.5 per cent., in cholecystotomy than in cholecystectomy. I make that qualification in Dr. Kelly's statement, that there are cases occasionally where we have common duct obstruction in which it becomes necessary to do cholecystectomy.

Dr. Bacon Saunders, of Fort Worth.—I would take exception to the statement of Dr. Winslow where he says that if the gall-bladder appears to be sufficiently diseased to necessitate its removal, it is better to remove it. I think the old maxim should apply in these cases as elsewhere, that where there is doubt about whether the gall-bladder should be removed or not, we should give the patient the benefit of that doubt and drain. It is certainly the safer of the two methods to pursue.

With reference to the remarks made by Dr. Fort, who says that these small, contracted gall-bladders should be removed, I wish to say that they are the difficult ones to remove, and are those in which we have a high mortality attending the operation, and they are the very ones where drainage is a safer procedure for us to resort to. I should like to object to the removal of these small, contracted, dry gall-bladders, gall-bladders that are contracted down on stones, as I think they can be safely drained, and it is much better to resort to drainage than to attempt cholecystectomy.

With reference to another statement made by Dr. Winslow, in regard to those cases in which the appearance of bile is very slow. In such cases my observation has been that we are in

too much of a hurry to take out the drainage tubes. In the great majority of these cases the cystic duct will become patulous again unless there is malignant obstruction, or unless there is actual obstruction of the duct in a great many cases. I have hardly seen a case in which the appearance of bile did not come sooner or later if we kept up the drainage long enough. I think it is a mistake to take out the drainage tubes in two weeks in these cases of old chronic gall-bladders, particularly where the walls are much thickened, and they should be drained for six weeks or more, and if this is done they will get well just the same.

Dr. William B. Coley, of New York City.—While I agree in general with everything Dr. Long has said, my feeling is with Dr. Fort, and, it seems to me, throughout this whole discussion there has been the assumption that removal of the gall-bladder precluded drainage. When I remove a gall-bladder I put drainage in the cystic duct, and this does as much good to the pancreas as if we drain through the gall-bladder itself. I think there are certain cases where it must be left to the individual surgeon to determine in what cases the gall-bladder shall be removed, and in what cases it should not. When we have a semi-gangrenous gall-bladder, with the mucosa all gone, I think it is better to remove it rather than to leave it.

Dr. Long (closing).—There has been such concurrence of opinions, except with regard to minor points, that I do not feel like prolonging this discussion.

I would like to say, in reply to Dr. Winslow, that in gall-bladder surgery, as in all other surgery, the matter of personal equation has a great deal to do in deciding what is best.

SUPPURATING ECHINOCOCCUS CYST OF THE LIVER; ENUCLEATION OF SAC; RECOVERY

By John Chadwick Oliver, M.D.
Cincinnati, Ohio.

Examples of hydatid cysts of the liver must be very rare in the vicinity of Cincinnati, because so far as I can ascertain this is the first case of this nature in the living subject reported from our city. I have personal knowledge of three cysts of this character found at necropsies. Dr. H. W. Bettmann has recorded one such, the late Dr. Kebler found one, and I had the good fortune to discover a very small hydatid cyst at a postmortem examination several years ago. It seems rather remarkable that more of these cysts are not found, because Cincinnati has a large number of foreigners from countries where this disease is more common added to her population each year. Many of these become patients in the city hospital, so that our opportunities for encountering this disease are fairly good; but the fact remains that but very few examples have been found either in the wards or in the necropsy room.

The patient, the subject of this report was a Roumanian, a widow, aged twenty-four years. She had no knowledge of the English language, so our communication with her was very limited. We succeeded in obtaining some of her earlier history from a friend, but we had no means of getting any information from the patient herself.

The patient had not been well for about four years. The only history we could obtain was to an illness in which cough, loss of weight, night sweats, and frequent pulmonary

hemorrhages were marked symptoms. There had been an attack resembling hepatic colic about two years before her entrance to the hospital, but nothing definite could be secured which seemed to have any direct bearing upon her condition at the time of our first acquaintance.

She had been working in a tobacco factory and continued at her work daily until the evening on June 28, 1910. She felt bad all day and in the evening was feverish. She suffered with general aching and fever for two days. On June 30, pain in the right hypochondriac region developed. This pain, while continuous, showed exacerbations and remissions.

Her temperature was 102° when she was admitted to the Cincinnati Hospital on July 7, 1910. It was deemed possible that her septic condition might have been due to some pelvic difficulty, but a thorough examination of the generative organs dispelled that suspicion.

The medical examination revealed a subicteric hue of the conjunctiva, evidence of an old tuberculous process at each pulmonary apex, a normal heart, and a trace of bile pigment in the urine. The abdomen was asymmetrical because of a fulness in the right upper quadrant. The abdominal walls were flaccid, but the patient complained of exquisite tenderness over the bulging area. A mass, extending from the right costal margin downward to the umbilical line and inward to the median line, was readily palpable. The enlargement was smooth, regular, and everywhere firm except at one point about midway between the costal margin and the line of the navel where fluctuation was apparent. Palpation of the mass caused much pain, but no thrill was present.

The abdomen was soft and flaccid during the early part of the woman's residence in the hospital, but by July 13, six days after her admission, abdominal rigidity was a marked feature. The entire abdominal wall became tense. The intra-abdominal enlargement increased and with it came added pain and tenderness. The temperature was

clearly septic in character and the patient lost weight and strength.

She was transferred to the surgical service July 19, 1910. By that time the enlargement had extended to the crest of the ilium and had passed to the left of the median line. Blood examinations were negative. The leukocytes numbered 7200 and 7600 on two occasions.

The history and symptoms pointed clearly to an abscess of the liver, and that was the diagnosis made in the medical service and fully accepted in the surgical department.

Dr. Frank E. Fee, my junior surgeon, opened the abdomen by an incision through the right rectus muscle on July 21. The liver was not adherent to the anterior abdominal wall, but was enormously enlarged. A yellow point indicated the near approach of the cyst to the surface of the liver, and at this point fluctuation was apparent. A ring of iodoform gauze was introduced and the patient was returned to her bed for twenty-four hours.

An aspirator needle was thrust into the fluctuating spot the next day and a clear fluid was withdrawn. A second puncture through the substance of the liver yielded a similar result. Some of this fluid was sent to the laboratory and an immediate report said that many hooklets were found. Forty ounces of clear fluid were withdrawn.

The thermocautery was used to cut through the inch of liver tissue that covered the cyst. The cyst wall was enucleated by blunt dissection and traction after the contents of the sac had been evacuated by aspiration. During the enucleation of the sac a purulent collection was encountered *outside* of the cyst wall—an apparent effort of nature to cast off the offending cyst. The sac was extremely thin at points, but it was removed *in toto*.

The after-history was uneventful. The drainage which consisted of pus and bile gradually decreased, and the patient was discharged well, August 30, 1910, six weeks after the operation.

REMOVAL OF A TUMOR OF UNCERTAIN CHARACTER FROM THE LIVER; RECOVERY

By John Chadwick Oliver, M.D.
Cincinnati, Ohio.

Mr. P. Y., aged thirty-one years, is a farmer by occupation, but was for several years a member of the United States Army. For two years prior to the time he came under my observation he had suffered with a fixed pain under the middle of the right rectus muscle about one and one-half inches below the right costal arch. The pain was distinctly nearer the median line than the gall-bladder. The pain on rare occasions was also felt under the right scapula and in the right shoulder. "Hunger-pains," *relieved but for a short time by eating,* were complained of. There was no increase of pain at the time food should have been passing from the stomach into the duodenum. He had never vomited.

The patient passed some scyballæ and mucous from the bowels, and on two occasions the mucus was blood-streaked. An examination of the feces by Dr. F. B. Samson failed to reveal anything of importance.

Several examinations of the gastric contents proved the gastric secretion to be normal.

The patient was kept under observation for six months and treated for duodenal ulcer by Dr. C. A. Eckler, of Dry Ridge, Kentucky. This was done at my suggestion, because I thought that duodenal ulcer was the most likely diagnosis.

The patient was not benefited by the treatment, so on January 3, 1910, the abdomen was opened. A careful exam-

ination of the stomach and gall-bladder failed to show any pathological condition, but a hard, yellowish-white tumor about the size of a large hickory nut was discovered at the left margin of the right lobe of the liver. The tumor projected from the free margin of the liver, but the greater part seemed embedded in liver tissue.

The mass with the surrounding liver tissue was excised. The liver substance around the tumor was sclerosed and its removal was accompanied with a minimum amount of hemorrhage. A gauze drain was inserted down to the site of operation.

The patient recovered from the operation and has been free from his old symptoms ever since. He has gained in weight and strength and seems perfectly well.

The tumor was almost entirely devoid of bloodvessels, was yellowish-white in color, of a consistency similar to that of the meat of a walnut, and looked, on section, like swiss cheese.

Microscopic examination by Dr. F. B. Samson. Specimen submitted January 3, 1910, by Dr. J. C. Oliver, for section and microscopic examination.

This specimen was a nearly spherical tumor, one inch in diameter. It had no pedicle. Its surface was of a rather dense, fibrous tissue, whitish and by its roughness, showed that it had been dissected or torn away.

Upon opening the tumor, it was found to consist of a fibrous sac filled with a cheesy mass—somewhat jelly-like—light buff with a pinkish tinge, of a uniform consistency and appearance. The central mass entirely filled the sac and bulged slightly on the cut surface.

The section of the sac was white in color and from one-eighth to one-sixteenth of an inch in thickness.

The indistinct line of demarcation between the sac and its contents contained a number of small areas of calcareous deposit. One of these areas extended from the sac one-sixth of an inch into the central mass.

A number of sections were cut and stained by the hematoxylin-eosin method.

Under the microscope the central mass was seen to be necrotic material staining only faintly with eosin and not at all with the hematoxylin.

It consists of a rather close and indistinct network of fibrillæ. In many places there were round openings from which cells had probably fallen.

No distinct cells or nuclei were found.

A few bunches of crystals, possibly soap crystals, taking a blue stain, appeared here and there.

There was no round-cell infiltration nor sign of organization except near the capsule.

The capsule consisted of white fibrous tissue with few nuclei and few bloodvessels.

At places red blood corpuscles appeared in masses between the fibers. There was no distinctly laminate appearanced as occurs in an echinococcus cyst.

The line between the capsule and its contents was generally well marked. Along this line and on each side of it in the capsule and in the central mass were a number of areas of round-cell infiltration of a lymphocytic, not of a polymorphonuclear type.

Here and there newformed connective-tissue had apparently pushed out a little way from the capsule into the central mass.

A number of small deposits of calcareous material also appeared on both sides of this line.

Neither hooklets, giant cells, nor tubercles were found in the tumor, and a search made for tubercle bacilli yielded negative results.

The round spaces, already mentioned, in the central mass were so placed as to suggest hepatic lobules with their central vessels, but on further examination this idea was discarded as improbable. No other trace of liver tissue could be found and no trace of lymphatic tissue.

The capsule was not of the glistening appearance usual in an echinococcus cyst, neither was it folded or wrinkled, as one would expect in a cyst which had been larger and had shrunken when its contents had lost their fluid, leaving only the solids.

Considering the small number of positive findings and the large number of negative findings in this case, I am obliged to say that I can make no positive diagnosis and can only guess that we may have here an old encapsulated tuberculous area or possibly a degenerated, consolidated echinococcus cyst.

One sister of the patient died from tuberculosis, but the patient himself failed to give a positive reaction to the Pirquet test.

DISCUSSION

Dr. Alexander Hugh Ferguson, of Chicago.—Rather than let this excellent paper go without discussion, I would like to say a few words regarding hydatids of the liver. They may occur in three different forms; the endogenous and exogenous are amenable to operative procedures. Then there is ecchinococcus multilocularis. In this form Glisson's capsule is so extensively involved that operative procedures are of no avail.

When I began my surgical work an Icelandic settlement of 25,000 people came to Manitoba, Canada. I found that many Icelanders had hydatid cysts. This subject is very familiar to me. Hydatid cysts may be found in any part of the human body.

Relative to the liver, we find them rarely in its centre, usually arising underneath the peritoneum. The tumor appearing in the region of the liver, and the patient being an Icelander, was sufficient evidence to suspect an hydatid cyst. Sometimes, however, we would find the diagnosis impossible without exploration. I recollect an illustrative case. A man was taken very suddenly ill with hepatic colic, and to moderate his pain I had to give him morphine freely. To make a long story short, the relatives of the patient would not agree to an operation, but they did to a postmortem. I found the daughter cysts were coming away through the biliary tracts, and the common and right hepatic ducts were completely occluded. These daughter cysts in the ducts simulated gallstones. In that case it would be utterly

impossible to make a diagnosis without an exploration. The description given by the essayist is very accurate of the conditions that are found in these cases. In the removal of large cysts, drainage must be established. The ectocyst is composed of fibrous tissue and a certain amount of liver tissue. Sometimes you have to do a partial hepatectomy. Liver surgery is quite easy here as compared to the removal of sarcoma from the liver.

Hyatid cysts undergo suppurative changes. I remember one case of hyatid cyst of the liver in a man of twenty years duration, in which suppuration took place. I opened the abscess and found he had a large cyst alongside of it that was not infected. I tapped it. When I was through he had very little tissue left between the destruction by suppuration and what I removed. He died in six or eight weeks thereafter. He had only seven ounces of liver tissue left. A man cannot live with seven ounces of liver tissue.

I recall one case in which a calcareous condition took place. The patient was a man, aged fifty-two years, who had had a very large hydatid cyst for twenty-five years. I operated on him, and found it was calcareous. He subsequently died of pneumonia. We held a postmortem. An interesting feature in this case was that he had compensatory hypertrophy of the left lobe of the liver nearly equal to the size of the normal liver.

Dr. Thomas S. Cullen, of Baltimore.—Some months ago while Dr. Kelly was operating I happened to be present and saw him remove what was apparently a carcinoma from the lower edge of the liver. He cut out a large wedge. A few days later, at one of the neighboring hospitals, I had a case in which there was a suspicion of carcinoma extending from the gall-bladder into the liver substance. I took out a large wedge in that case and found extensive areas of calcification. Histological examination of both cases showed that no carcinoma existed, but syphilitic gummata were present. Dr. Oliver's case bears the ear-marks of isolated syphilitic nodules in the liver.

Dr. Randolph Winslow, of Baltimore.—So far as I am aware, in the hospital with which I am connected we have had but one case of echinococcus of the liver, which occurred in the practice of my colleague, Dr. John Holmes Smith, in which the cyst was supposed to be a gall-bladder cyst, and when cut down upon a lot of material escaped like the skins of grapes, as if the grapes had been compressed and the skins left. At first it was difficult to recognize what the condition really was, but subsequently we recognized it as a case of hydatid of the liver, and the woman eventually recovered. I am not aware of other cases in Baltimore.

Dr. Joseph A. Danna, of New Orleans.—I have had two cases of hydatid cyst of the liver in my experience at the Charity Hospital, New Orleans. I mention them because both patients were native Louisianans, and lived in Louisiana all their lives. I must plead guilty to not having made an examination of the contents of these cysts, but they were large cysts, both situated in the lower border and rather under the liver, and both were removed by enucleation, followed by drainage, and both patients made uneventful recoveries.

CHRONIC URETHRITIS AND CHRONIC URETERITIS CAUSED BY TONSILLITIS

By Guy L. Hunner, M.D.
Baltimore, Maryland.

The tonsils have been made the scapegoat for so many human ills that one hesitates to bring another charge against them. For eighteen months past, since having my attention directed to the possible relationship between tonsillitis and certain cases of chronic urethritis, and chronic ureteritis, the evidence has been accumulating with such force that I feel justified in drawing up the indictment, and asking this society to take the problem under advisement and to pass judgment after further experience may have justified or negatived my claims.

In a comparatively recent paper, Rosenheim ("The Tonsillar Ring and the Paranasal Sinuses as Portals of Entry of Infectious Diseases," *The Johns Hopkins Hospital Bulletin*, November, 1908, vol. xix) has reviewed the literature and found the following list of ailments ascribed in certain cases to tonsillar infection: Aneurysm, appendicitis, erysipelas, and a number of other skin manifestations, meningitis, iritis, pleuritis, pericarditis, pneumonia, paraplegia, and strabismus, parotitis, nephritis, osteomyelitis, phlegmon of the lower extremities, oöphoritis and orchitis, septicemia, typhoid, beginning with an angina, and tuberculosis.

It is only natural that we should look upon such a list with some mental reservation, but no intelligent physician

of today will deny that the infections and toxins of tonsillitis have an important causal relationship in many forms of rheumatism.

Those who have worked with the diseases of the urinary organs in women have, for a number of years, been familiar with the so-called rheumatic urethritis. In using this term I wish to exclude the old text-book application, for undoubtedly most cases of chronic granular urethritis are due to old gonorrheal infection, and the old text-books included these under the term "rheumatic." But we have seen many cases in which gonorrhea could be ruled out to a practical certainty, and for which we have been at a loss for the etiological factor. This is particularly true in the cases of respectable maiden women who have a persistent urethritis and have intact hymen and very little probability of ever having contracted gonorrhea. Some of these chronic urethritides are associated with vulvitis, and I have been inclined to class some of these as traumatic infections due to onanism. We see rare cases of cystitis and urethritis following immediately after marriage in which gonorrhea can be ruled out, and we find the infecting agent to be the colon bacillus or some other microörganism. These are undoubtedly traumatic infections. Theoretically a few of our chronic urethritis cases might be classed as auto-infections because of the very short urethra and the myriads of bacilli and cocci normally inhabiting the external urethral orifice region.

If we rule out these possible auto-infections, gonorrhea, and trauma and infection from childbirth, coitus, and onanism, we still have left a not inconsiderable proportion of our chronic urethritis cases for which we have heretofore been at a loss to explain the origin, and we have generally classed them as rheumatic urethritis.

As a matter of fact, most of these cases have suffered from some form of rheumatism, and the local urethral treatment is more effective if the patient is given simultaneous internal antirheumatic treatment.

My experience with these cases is that they generally respond to the local treatment more quickly than the chronic gonorrheal cases (although there are numerous exceptions to this rule), and, as a rule, they relapse within a few weeks or possibly months after they think themselves well.

I am not certain that there is any cystoscopic picture to differentiate the rheumatic from the gonorrheal cases, but I am under the impression that we will find many of the rheumatic cases most inflamed about the inner third of the urethra, while we all know that in the gonorrheal cases the inflammation persists longest about the outer third of the urethra, where are located most of the urethral crypts and glands.

Case I.—My attention was first called to the possible relationship between the tonsils and the urethra by a patient whom I had been treating for chronic urethritis from December, 1908, to May, 1909. During this five months I had been treating the urethra once or twice a week by dilating with Hegar dilators and mopping the urethra with either 3 or 10 per cent. silver solution. During this time I had on one occasion prescribed a gargle for a sore throat. On May 20 the patient asked me why her throat should always be irritated immediately after I made the silver application. This sore throat lasted as long as the urethral reaction was active, about twenty-four hours, if I used the 3 per cent. silver, and as long as three days after the 10 per cent. silver. She said that she had noticed this phenomenon since treatment began, and she had also noticed that her throat and urethral irritation always seemed to be aggravated in damp weather. I examined her throat and found that the tonsils were large and presented numerous crypts over the surface. I referred her to Dr. T. Chew Worthington, who reported as follows: "The tonsils, while very deep and buried between the pillars, are much larger than they appear, and show evidence of frequent inflammation, and I believe they are largely responsible for her rheumatic trouble, but I do

not know to what extent they may cause the urethritis." They were so riddled by necrotic foci that it was impossible to remove them except by morcellement. I saw the patient three times within the next two months, and her symptoms had rapidly disappeared, although she was having some discomfort at times and the urethra showed some granulations over its inner half.

One can scarcely appreciate the marvellous change in this patient without knowing the details of her history and having treated her as I did for five months without appreciable permanent relief. She was a single woman, a seamstress, aged forty-two years, and had entered the menopause two years previously. She remembers one attack of inflammatory rheumatism when twenty-five. She had had bladder irritation at times for eight years, this occurring only once or twice a year up to within two years ago, since which time she had had no relief. She complained of great frequency and of sharp, stinging pain in the neck of the bladder while voiding. She was often afraid to leave the house because of her inability to control the bladder. In addition to the local symptoms, she had pain in the right groin and great discomfort and soreness across the entire lower abdomen. She often had a sinking feeling, nausea, and a desire to void if she made a mis-step while walking, or if she rocked in a chair or drove over a rough road, or rode in the street car. Bimanual examination of the pelvis and lower abdomen elicited considerable muscle spasm, and because of this and her very indefinite symptoms, I was led on several occasions to think of the possibility of chronic appendicitis. Pelvic examination and high rectal examination were negative. Palpation over the urethra caused reflex pain in the bladder region. The most striking feature of her examination was the fact that on distention of the urethra when injecting the 10 per cent. cocaine solution preparatory to the urethral treatment the patient always complained that I caused her typical abdominal pains reaching as high as the umbilicus,

and a feeling of nausea. It was this one persistent and consistent complaint of the patient that soon led me to cease thinking of a chronic appendicitis. It well illustrates also a dictum that I have given my students for a number of years, viz.: When dealing with any obscure abdominal complaint located below the level of the umbilicus never overlook an examination of the urethra.

Within two months after the tonsils were removed the preliminary distention of the urethra with cocaine did not cause abdominal discomfort. Her spontaneous abdominal discomfort had disappeared and her only symptom was a slight local irritation in the urethra.

At my request she came to my office on December 1, 1910. She had been practically well for the intervening fourteen months. On some days she is conscious of a slight uneasiness in the bladder, but she often holds the urine all day. She has never had the soreness across the hypogastrium nor the nausea and sinking attacks. Riding over a rough road or jarring from any cause does not affect her. While formerly she never dared sit in a draft, she now does not consider such matters. The anxious, harassed expression of the face has disappeared, and she claims to be in perfect health. Cystoscopic examination shows the urethral mucous membrane to be normal.

Case II.—In February, 1909, Dr. A. I. Miller, of Brattleboro, Vermont, sent me a Miss B., aged thirty-five years, who had been complaining of bladder trouble since an operation for uterine displacement in October, 1907. The patient was in an extremely nervous condition, and examination showed the urethra to be contracted throughout its length and to have very granular, red mucosa. She remained at the Johns Hopkins Hospital for six weeks, being treated for her nervousness and having the urethra treated about once a week. Within six weeks the urethra easily took a No. 12 Hegar (12 mm.) dilator, and its mucosa was normal looking. Fearing a return of her trouble, the patient did not go home

on dismissal from the hospital, and her fears were well founded, for her urethral irritation returned in a few days. In May the patient was complaining of joint trouble for the first time, and was placed on asparin treatment, which helped her joints and seemed to help the urethra. After my experience with the first case, and in view of her rheumatic manifestations, I examined the patient's throat and found that she had large tonsils. She refused to have these operated upon until December 23, 1909, when Dr. H. C. Davis removed her tonsils, finding them in much the same condition as those found in the first patient. The patient's urethra answered more readily to the treatment after the removal of the tonsils, but for about seven months there was a small area at the base of the right tonsil which became much irritated at times, when the patient was very likely to complain of rheumatism in her knees and of the urethral irritation. After repeatedly touching the spot in the right fauces with 10 per cent. silver solution, and dilating and touching the urethra with the same strength solution, the patient has finally made an apparent complete recovery. For four months past the irritation has been almost completely absent, and the urethral mucosa examined on a number of occasions has remained normal.

Case III.—Miss W., aged forty-eight years, admitted to the Johns Hopkins Hospital, October 10, 1901, complaining of bladder trouble, indigestion, and nervousness. The menopause occurred four months previously. As a child the patient had measles and diphtheria. She had pneumonia when eighteen, and suffers with neuralgia and headaches. Six years ago she had an infection of the middle ear from her throat, and the ear drum ruptured and drained freely. Hearing has been impaired since, and she has had occasional attacks of earache. She has had hay fever every summer for years.

Present Illness. Four years ago, or in July, 1897, she first had bladder trouble, as a frequency of voiding with intense

pain, and the urine contained blood and mucus for several days. The pain and frequency lasted three months.

In the past four years she has had about two attacks a year, usually lasting about two weeks. In January, 1901, she was confined to her room for one week with an attack, and since then has constantly felt that an attack was impending. Her present attack came on five weeks ago. It began with intense pain, which prevented sleep. The pain was more severe on voiding. She passed some blood.

Examination revealed a normal bladder and a severe urethritis located in the inner third of the urethra.

A few treatments resulted in an apparent perfect cure.

She was again admitted to the Johns Hopkins Hospital on March 14, 1910. After leaving the hospital in 1901, the patient was free from urinary symptoms for two years. Her symptoms of frequency and pain then began, and for two years she had occasional loss of control of the urine. In 1905 she had a severe attack of typhoid fever, with a long, slow convalescence, and now for five years she has had almost constant bladder trouble. For the past year her symptoms have been worse, and she generally wears a napkin because of complete incontinence.

I examined the patient March 16, 1910, and found a catheterized specimen of urine clear. After applying 10 per cent. cocaine and placing the patient in the knee-breast posture, the urethra was first sounded with a 5 mm. Hegar dilator. This broke down what felt like a soft scar tissue obstruction at or near the internal urethral orifice. No further obstruction was felt in dilating up to No. 10 Hegar.

The baldder was normal, but the urine settled in the vertex was bloody. This blood was found to be flowing from the anterior aspect of the internal sphincter region, probably from the obstruction felt to give way under the No. 5 Hegar.

The patient improved rapidly under the treatment by dilatation and applications of 3 per cent. silver solution.

After three weeks she complained of an attack of sore

throat, and examination showed enlarged and inflamed tonsils. These were removed April 22, by the tonsillotome, and the patient was soon discharged. In answer to a letter in November, she wrote in part as follows: "I am stronger than when I went to the hospital last March, but the bladder trouble is no better; in fact, it is so bad I very seldom leave home. I cannot see that the removal of the tonsils has helped me at all. I have just as much rheumatism and sneeze very much each day; in fact, more than I ever did."

If my theory is tenable, this is just the result one would expect from partial removal of the tonsils by the tonsillotome. Her reference to the persistent sneezing and her "nasal" method of talking made me think that she has paranasal sinus infection as well, and she has been advised to return for more complete attention to the tonsils and air passages. You will notice by the dates that this patient had gone home before my experience with the tonsils in Cases I and II.

Case IV.—Miss H., aged twenty-six years, consulted me July 14, 1910. For about three years the patient has had bladder symptoms more or less constant, but exaggerated with overexertion and particularly on damp days. When at its worst there is almost a constant desire to void urine. She does not consider the distress a pain nor a severe burning, but says it is more of a nagging. For the past five or six months there has been a peculiar tired feeling in the right pelvis, and the patient has worried for fear that some serious condition is developing.

The patient had quinsy twice as a child, and she was bothered a great deal with her throat. She had a severe attack of quinsy last winter, and after four days the abscess ruptured. She has not had rheumatism. Examination of the heart revealed a soft systolic murmur over the mitral region, and an accentuated second sound at the base. Both tonsils were enlarged. The bladder urine was normal. The urethra was very tender on introduction of the catheter, and on examination it was found to be granular and red-

dened throughout its length. The urethra was dilated and swabbed with 3 per cent. silver solution on July 14 and 21. The patient was sent to Dr. Sanger, who removed the tonsils early in August. He reported the right tonsil as badly diseased. Two weeks after the tonsillectomy I found the urethral mucosa less tender and less inflamed. I gave the third treatment, and the patient left the city to take a position as school teacher. I have heard indirectly that she is greatly improved in health, and as the urethra seemed to be the only point of complaint I conclude this must be improved.

To briefly review the evidence in these four cases: Case I, so long as she could remember, had a tendency to "catch cold" easily, and had to avoid drafts. She had an attack of acute inflammatory rheumatism involving the joints of the left side seventeen years previously. For eight years she had had attacks of bladder trouble, which for the past two years had kept her in almost constant agony, and often kept her housed because of the inability to control the urine. Five months of regular treatment about once a week had made but little impression on her urethral and reflex abdominal symptoms. After the tonsils were removed, three treatments in the next two months resulted in a cessation of practically all her symptoms, and she was able to often carry the urine an entire day. This cure has now lasted for fourteen months.

Case II had had constant bladder symptoms for over two years, the disturbed nights and diurnal irritation making of her almost a nervous wreck. Bladder and urethral treatments, before I saw her, had been without effect. Treatment of the urethra for six weeks while she was in bed resulted in an apparent cure, but one week after leaving the hospital the symptoms returned and the urethra looked as inflamed as ever. Months of treatment, with the patient boarding in the city and having almost complete rest, gave occasional periods of one to two weeks of improvement in the symptoms. After the tonsils were removed there was

one inflamed area in the base of the right tonsil region which for seven months gave occasional exacerbations of sore throat accompanied by pain and tenderness in the knee-joints and an exaggeration of the urethral symptoms. For the past four months the patient's throat has been giving but few symptoms, and the urethra has been well as regards symptoms and appearance. After the tonsil operation the patient took a position as matron of a woman's dispensary, her duties ranging from bookkeeper to scrub woman, so that her improved health cannot be ascribed in any way to opportunities for rest.

Case III, when first admitted to the hospital in 1901, had suffered for four years with recurring attacks of bladder trouble. A few treatments of the urethra gave complete relief. For two years she had approximate health, and then for seven years her bladder trouble had been growing worse until she had to permanently depend upon a pad for catching the urine. Again a few urethral treatments seemed to relieve her condition perfectly. Her tonsils were then shaved off with a tonsillotome, and within a few weeks her symptoms became as bad as ever.

Case IV has complained of bladder trouble for three years, and gave a clear history of tonsillar trouble since childhood, with three attacks of quinsy. In her case the tonsils were removed after two urethral treatments, so we have not the striking demonstration of the futility of urethral treatments while the tonsils remain as in the other three cases.

I realize that these four cases of chronic urethritis are too few in number and of too recent occurrence upon which to found reliable conclusions. The evidence here set forth, however, is sufficient to warrant a more careful study of our chronic urethritis cases, for if we can relieve permanently only a small proportion of these chronic sufferers by a comparatively simple operation, we will have made an important advance in therapeutics.

Since being alert for these cases I have added seven others

to my list who probably belong to this class. Some of them have been under my care intermittently for several years, and it is only because they have chanced to return during the past few months that they are mentioned in this report. None of them have been operated upon; a few will not be mentioned at all.

One of the most interesting of these was a Mrs. M., of St. Paul, who phoned me from New York, in September of this year, asking for an office appointment, and stating that she had been my patient three years ago. On looking up her history I made a mental prediction that diseased tonsils would be found on another examination.

The history taken on her first visit, in May, 1907, was as follows: About June, 1906, she developed rheumatism in the right knee, for which she went to Mt. Clemens, and while under treatment there the trouble involved the joints of the right hand and the third finger of the left hand. About this same time she began to have "bladder trouble." This developed gradually as a scalding or burning which was more likely to come on ten or fifteen minutes after voiding, and which she thought was in the urethra rather than in the bladder. She had no trouble at night; the aggravation had been more persistent for the last four months occurring every day or every other day and preventing her from walking or taking much exercise. On further inquiry regarding her rheumatism, she said that in 1891 she had rheumatism in the right shoulder and arm, and in 1903 she was at the French Lick Springs for rheumatism in the right knee. When she first consulted me she had just spent six weeks at the Arkansas Hot Springs for rheumatism in her hands.

The urine upon examination was normal, the bladder was somewhat reddened about the trigonum, and the urethra was narrowed and showed a granular red mucosa throughout its length. I made a diagnosis of chronic granular urethritis of rheumatic origin. After two treatments, consisting in the

dilatation of the urethra and the application of 3 per cent. silver solution on the first visit and of the 6 per cent. silver solution on the second visit, the patient was obliged to return home. I sent instructions to her physician in St. Paul concerning further treatment.

On her return in September of this year she stated that she had been fairly well and had taken no further treatment. She had recently had considerable anxiety and was in bad physical condition, and her urethral trouble had returned. I examined the urethra through the Kelly cystoscope without first disturbing it with the Hegar dilators, and found that the granular redness was confined to the sphincter urethra and to the mucosa of the inner third of the urethra. In view of my recent experience I quizzed her more closely, and found that she had her first bladder symptoms when sixteen years of age, that she often had a sore throat as a child, but does not remember having tonsillitis. This past winter she had considerable "rheumatic sore throat." I examined her throat and found much congestion about the fauces; the tonsils were considerably enlarged and had deep crypts over the surface, these being free from white deposits at the time of my examination.

I sent her to a laryngologist, who considered that her tonsils were undoubtedly a causative factor in the rheumatism.

Mrs. R., aged thirty-two years, mother of three children, the youngest four years old, referred by Dr. Gaver, of Mt. Airy, and admitted to the Church Home in June, 1909. She has had bladder trouble for the past three years, with only brief intervals of freedom of pain. At times she has been in bed a week because of agonizing pain. At times there has been pain in the right flank region, and she is now wearing a plaster because of the pain and weakness in this region. I first thought, on taking her history in my office, that she probably had tuberculosis of the right kidney. The urine catheterized from the bladder contained many epithelial

cells, leukocytes and red blood corpuscles. Examination for tubercle bacilli was negative and the urine contained many cocci, some arranged in pairs, suggestive of gonococci, but none could be found in the pus cells. After a day of rest in the hospital cystoscopy was done and the urethra was dilated with difficulty, there being a stricture about half way in and another at the internal orifice. The trigonum was of a deep red and apparently swollen; the bladder mucosa was everywhere traversed by congested vessels. Both ureteral orifices were red, but neither showed particular evidence of disease. The right ureter was catheterized with a No. 5 wax-tipped bougie, which returned without scratch marks. The urine from the right kidney was normal. After a few days' observation I made a diagnosis of appendicitis, and a large congested appendix was removed. During four weeks in the hospital the patient received treatment for her cystitis and the urine became normal.

I have given this patient many urethral treatments in the past eighteen months, and the stricture at the inner orifice still persists, and she still has occasional attacks of urethral symptoms accompanied by granular reddening of the mucosa.

The patient had her tonsils removed about three years ago, but she does not remember the chronological sequence of her bladder and tonsillar trouble. She still has considerable throat trouble, and examination shows a mass of tonsillar tissue on the right side.

The possible relationship between tonsillitis and ureteritis has been brought to my attention only recently, the two cases possibly belonging to this class still being under observation and only one of them having had her tonsils removed.

In September, 1910, Dr. Herman F. Derge, of Eau Claire, Wisconsin, sent me a patient, aged twenty-six years, who had the following history: Six or seven years ago she had an attack of pneumonia, which was followed by tonsillitis and rheumatism. At that time her tonsils were treated with the cautery.

Soon after this she began to have attacks of pain in the left flank region. At first these attacks occurred every two or three months, and the patient would lie down and flex the left leg for an hour or two until the attack disappeared. Her attacks gradually became worse, but she never had any nausea or vomiting with the attacks until this last spring.

In February, 1910, she had an attack of tonsillitis and rheumatism, followed by similar attacks in March and April. After this her attacks of pain in her side became much more severe, and were accompanied by nausea and vomiting. Dr. Derge wrote me in August that he had had the patient under observation in the hospital for four weeks. "During this time her temperature has always been normal, and the pulse has ranged between 72 and 96. For the first three weeks the urine contained constantly 1 gram of albumin, pus cells, some red blood corpuscles, and a small, rather thick bacillus. On two separate occasions I have examined the urine for tubercle bacilli, but have found none. I have also cystoscoped her twice, and on each occasion failed to get a catheter into the left ureter. The bladder itself looks perfectly normal and she has had no vesical symptoms. For the past week the urine has looked perfectly normal, there being neither albumin or pus cells present, and she excretes, on an average, 2 liters a day. Yesterday she had another attack of pain in the left side, was nauseated, and vomited."

On her arrival in Baltimore the patient looked exceedingly ill; she had been having an attack the previous night, with much nausea and vomiting. I found a mass in the left kidney region projecting about 4 cm. below the costal margin. This was very tender, and on palpation of the pelvic brim in the ureter region considerable pain was caused. Urine catheterized from the bladder was acid, showed a specific gravity of 1028, and contained a slight amount, about 0.1 per cent., of albumin. The microscope showed many epithelial cells and an occasional red blood corpuscle.

Three good *x*-ray plates of the kidney, ureter, and ureterovesical regions respectively were negative.

After a few days' rest in bed, with frequent injections of morphine to control her pain, I made an unsuccessful attempt to catheterize her left ureter. Nine days after her arrival I had Dr. Sanger remove her tonsils, and about ten days later I again failed to catheterize the ureter.

For two weeks after the removal of the tonsils the patient had about the same symptoms in the kidney region, the attacks being more severe, if anything. After this the attacks seemed to be less frequent and decidedly less severe, the patient was allowed to take walks and drives and go to the theatre, thus leading about a normal life, and her attacks of pain which occurred every two or three days were aborted with one injection of one-eighth grain of morphine, whereas her former attacks had required from one to three one-fourth grain injections.

Of course, one cannot expect a disappearance of the scar tissue involving the ureter after the removal of the tonsils, and I should explain the improvement in her condition as due to the exclusion of the toxins which had caused the repeated inflammatory attacks in the ureteral mucosa. After waiting two months and being unable to dilate the stricture from the bladder end, I operated to dilate the stricture from above. Through a left rectus incision the peritoneum was pushed medianward until the ovarian vessels and ureter were found running parallel in the peritoneum. This exposed the iliac vessels on the pelvic brim and the round ligament covered with peritoneum near its entry to the internal ring. It also gave excellent exposure of the bladder. By blunt finger dissection the ureter was easily followed down to the point where it ran under the uterine vessels. A point was selected on the ureter low enough down so that in case the stricture could not be dilated the ureter could be cut across and implanted into the bladder. At this point, about 5 cm. above the crossing of the uterine

vessels, the ureter was opened lengthwise and I had no trouble in passing gum-elastic filliforms, and finally a large follower 7 mm. in diameter, into the bladder. A renal catheter was then passed into the bladder and its distal end was passed almost up to the kidney. The ureter was closed with fine catgut and a small finger drain was carried down to the ureter wound. After the closure of the abdominal wound the table was elevated and through a Kelly cystoscope the pointed end of the renal catheter which had been passed into the bladder was located, grasped with the alligator forceps, and drawn out through the urethra. The pointed end was cut off and the catheter was fastened to the thigh by adhesive straps, and through this catheter the kidney was irrigated three times a day for five days, with 1 to 10,000 silver nitrate solution. The bladder was given a similar irrigation once a day.

It is now nearly three weeks since the operation, and the patient is walking about the hospital. She has had no sign or symptom of returning trouble in the left kidney.

The second case of stricture of the ureter is that of a colored woman, aged forty-eight years, who has been under my care in the cystoscopic dispensary for the past few weeks. She began to have bladder trouble in May, 1910. She complained of a frequency and burning, and thought she had caught cold in the bladder. For two years she had had mild attacks of pain in the right kidney region. These have occurred from one to three weeks apart, and she has no discomfort in the side between the attacks. Since the bladder trouble began in May, she thinks the attacks of pain in the side have been more frequent and more severe.

About the same time that the pain began in the side, two years ago, she had a bad attack of inflammatory rheumatism in the left knee. This lasted all winter. Off and on for three or four winters she has had rheumatism under the left shoulder blade and in the cervical vertebræ, this at times keeping her from work. She has noticed for the past

two years that she catches cold very easily and has a sore throat even in the summer time. Examination of the urine catheterized from the bladder showed a moderate number of pus cells. The right ureteral orifice was slightly inflamed, presenting such a picture as one sometimes observes when a stone lies low in the ureter. On four different weekly visits I attempted to pass a wax-tipped catheter to the right kidney, being successful only on the second visit. The wax tip returned without scratch marks. On injection of the kidney pelvis her pain phenomena in the right kidney region were imitated. The pelvis was but slightly dilated, holding but 12 c.c. of fluid. The point of obstruction to the renal catheter was located about 3 cm. from the bladder orifice of the ureter. *X*-ray examination of this region was negative.

The patient's tonsils are both enlarged, and she has promised to have them removed.

On meeting a stricture in the ureter and looking for the cause, one thinks in the order of their frequency of stone, tuberculosis, gonorrheal infection, and then of pelvic inflammatory disease, appendicitis, and pelvic or abdominal tumors. We sometimes meet an obstruction to the catheter which is not met on another occasion, and we conclude that the obstruction was probably peristaltic in character. Some obstructions are probably caused by unusual kinks in the ureter following inflammatory displacements. Most of the ureteral stricture or obstruction causes, such as stone, tuberculosis, and periureteral tumors, are easily differentiated. There are not a few strictures about the lower end of the ureter for which we have been unable to find an etiological factor. I have been inclined to think that some of these may represent a healed focus of tuberculosis, some an infiltration of scar tissue about a stone which has later been dislodged and passed, and a more probable supposition to my mind has been that a gonorrheal infection of the bladder may have resulted in infectious material or toxins being carried in the periureteral lymphatics and causing a focus

of inflammation in the ureter near the bladder. I have not been able to prove any of these suppositions in the case of ureteral stricture, and I am inclined to believe that this newer theory of tonsillar infections or toxins giving rise to ureteral strictures may be found to apply to some cases for the causation of which we would otherwise be in the dark. The futility of treatment by dilatation in such cases without removal of the tonsils is apparent.

I am not familiar with male genito-urinary work, but am told that many cases of chronic urethritis, trigonitis, inflammation of the vera montanum and other portions of the posterior tract cannot be traced to a gonorrheal infection. Dr. Geraghty, of the Johns Hopkins Hospital, tells me that he has seen cases of acute prostatitis with abscess formation which followed during or immediately after a tonsillitis. With such facts in hand, it seems not improbable that some cases of chronic urethritis associated with chronic prostatitis may have their origin from tonsillar infections or toxins.

DISCUSSION

Dr. J. M. Mason, of Birmingham.—There is one question I would like to ask Dr. Hunner. It seems, in listening to the paper, that all of these cases occurred in maiden women, in whom there is some possibility of nervous disturbance or reflex irritation of the urethra. I would like to ask him, therefore, if he has observed this condition in married women, or in those in whom the sexual relations were normal?

Dr. Gerry R. Holden, of Jacksonville.—I would like to ask Dr. Hunner whether the discharge containing pus cells in these cases was examined microscopically?

Dr. Howard A. Kelly, of Baltimore.—The subject Dr. Hunner has brought before us is one which bears upon a very important question, and one which I do not think we have quite yet settled. It has a bearing on what we call urethritis and trigonitis.

I have had one case which has some bearing on this subject, although it was not the tonsils, but an affection associated with rheumatism. The wife of one of my colleagues had been under my care for fifteen years past, having had more or less malaise,

and careful examination revealed pus in the urine, which was symptomless so far as the local conditions went. The pus varied in amount. She was in ill health. I catheterized and found that the pus came from one kidney—the left, I think it was. I dilated the ureter, washed out the kidney, and she got better, but after a few months came back for another investigation and treatment. She had had bad rheumatism for at least twelve years, so that she was practically almost bedridden. She had enlargement of the joints, and looked very much beyond her age. Last spring I went down to Cambridge, on the eastern shore, to see her, and in examining her found a large tender kidney, with a good deal of pus in the urine, and she consented finally to let me drain the kidney, but she would not let me exercise my judgment as to whether I should open it and do a plastic operation on the ureteral valve. The left semilunar valve was involved. I cut a band of fascia at the lower end of the ureter and established drainage through the side. The other drain did not work well. She continued to suffer with rheumatism through the summer, although she was somewhat relieved by the drainage in the side. This fall I took the kidney out, and the rheumatism has disappeared like magic, and her husband is very happy over the result. The woman looks twelve years younger. Coincident with the taking out of the kidney and the disappearance of the rheumatism, it looks like a case of rheumatoid arthritis.

Dr. John F. Oechsner, of New Orleans.—It strikes me, without particular reference to Dr. Hunner's cases, but more in connection with the remarks of Dr. Kelly, that it behooves us to determine definitely where these storage batteries of infection lie. As Dr. Kelly has made plain, the supposed case of rheumatism was an infectious arthritis from a pus collection in the kidney; so also are nearly all of the infectious arthritides, due to infections elsewhere in the body, secondarily deposited in or near the joints. We should endeavor by close examination to determine just where the septic focus supplying the particular joint involved lies. The term rheumatism is unfortunately still juggled with too much in an attempt to account for various infections, particularly those of the joints. It is probable that in Dr. Hunner's cases there may have been an antecedent urethritis, not necessarily specific, while dormant, lighted up by infection thrown out from a diseased tonsil; in other words, it is highly probable that the tonsils might act as storage batteries of infection, throwing out some of their contents into a vulnerable or traumatized area. I therefore make it a plea, to offset this haphazard and universal expression rheumatism, which we are trying to educate medical men to discard, to be more specific in determining the nature of our infection, what-

ever it may be, and in determining exactly where the focus of infection is. There is no question in my mind but that in these cases cited by Drs. Hunner and Kelly we were able to determine by this means exactly where the local infection was.

Dr. Hunner (closing).—In answer to Dr. Mason's question as to whether any of my patients were married women, I did not have the time to report a series of eleven cases that have turned up since those I have reported. Some of them were married women. The typical case is the unmarried woman with the adenoid facies, with tonsillar trouble, and with rheumatism, with due deference to the criticism of Dr. Oechsner.

I shall not attempt to give a definition of rheumatism. I have seen better men than I am try, and after they finished doing so I did not know any more about it than I did at the start. These cases, however, did not have pus in the urine. You cannot milk pus from the urethra as you can in an acute gonorrheal case.

As to the question of Dr. Elbrecht about the urine in these cases, they come to us with most typical cystitis symptoms. As you quiz them you would think, from the symptoms, that they could have any kind of cystitis, but when you catheterize the bladder there is no pus found in the urine. There may be an excess of epithelial cells if they have trigonitis. These patients have so much trouble in the frequency of voiding that they are afraid to drink water. If you put them on plenty of water, they will get rid of the excessive acids. These are cases of irritable bladder. Most of the cases are due to old gonorrheal infection, but there is a certain class of them which we must recognize as belonging to the tonsillar rheumatic type. I do not know whether it is a real infection, or whether it is a trouble generated by the toxins. I imagine it is the toxins which invade the lymphoid tissue about the urethra, and reinflame and irritate the urethra. They usually clear up quickly, only to recur with attacks of sore throat or during damp weather. They are not like the cases of true infection.

I think the tonsillar theory opens up a big field in the cases of ureteritis. We have seen that the cause of the irritation is not due to stones nor to tuberculosis, but the stricture may have been due to an old case of gonorrheal infection or toxins settling in one portion of the ureter, and that is a better theory than some of the others we have advanced for these cases. But we have no reason to suspect gonorrhea in many of these ureteral strictures, and I believe we will find many of them due to the tonsils.

Dr. Elbrecht.—Did you alkalinize the urine in these cases?

Dr. Hunner.—No.

THE BEST METHOD OF EXPOSING THE INTERIOR OF THE BLADDER IN SUPRAPUBIC OPERATIONS

By Howard A. Kelly, M.D.
Baltimore, Maryland.

The bladder is awkwardly placed for delicate surgical operations. It lies too far within the pelvis, and in men in particular it is too well protected by muscular and tendinous structures to make it easily accessible from below, except for such an operation, for example, as a simple incision and the extraction of a calculus.

The suprapubic route is also an awkward one, as it opens widely the loose, easily infected areolar tissues of Retzius' space, with the peritoneum close at hand and easily injured, and the bladder itself lying deep in the pelvis and relatively inaccessible.

These objections do not hold when there is a calculus of considerable size to be removed, but when the lower lateral walls or the base of the bladder must be reached, and any delicate surgery must be done, the operator often finds himself greatly embarrassed, particularly if the patient is stout.

The chief difficulty in reaching and exposing the bladder comes from the resistance experienced in drawing aside the recti muscles with their overlying fasciæ. The operator works at a great disadvantage in the lower angle of a rigid V, and every urologist of experience, I am sure, has at some time or other reluctantly cut the recti so as to get the wider exposure demanded by the difficulties of the projected vesical

Fig. 1.—The patient in the Trendelenburg posture, with the incision made about one inch above the symphysis pubis through the skin and fat down to the fasciæ, semilunar in form, with its concavity directed toward the navel.

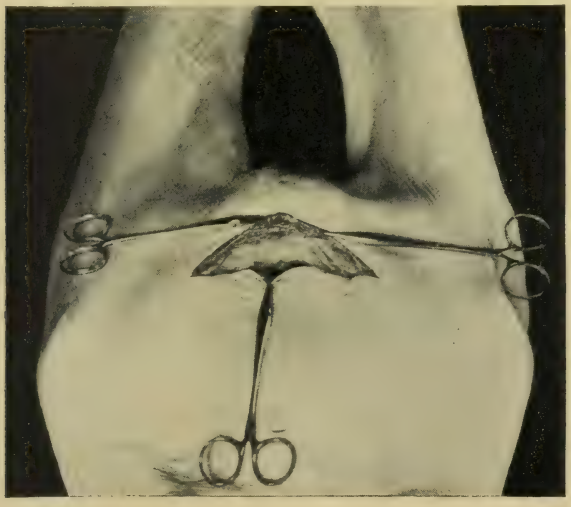

Fig. 2.—The skin and fat dissected up from the abdominal wall, exposing the deep fasciæ covering the recti and at the outer angle of the wound a part of the oblique muscles.

FIG. 3.—The strong abdominal fasciæ covering the recti and the oblique muscles dissected free from the underlying muscular tissues. This can be done with the blunt dissection except over the linea alba, where it must be cut.

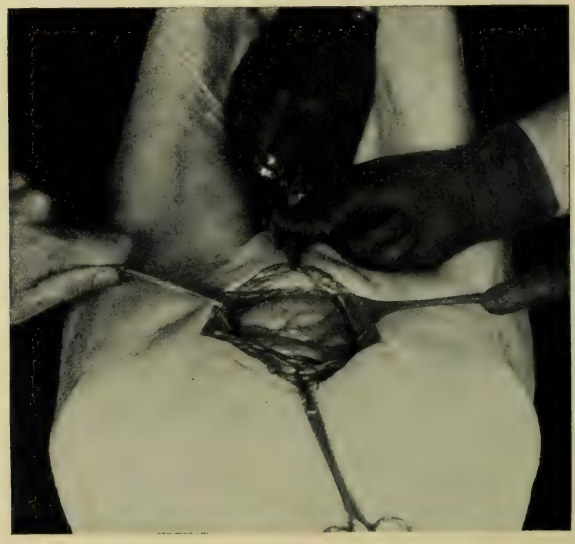

FIG. 4.—The flaccid recti, no longer splinted by the strong fasciæ above, are easily drawn aside by retractors, giving a maximum exposure of the bladder, which now rises up into view and fills the field as it is distended with air by the hand between the legs squeezing a rubber bulb. The rounded fold of tissue above the bladder toward the navel is the reflection of the peritoneum onto the bladder attachment.

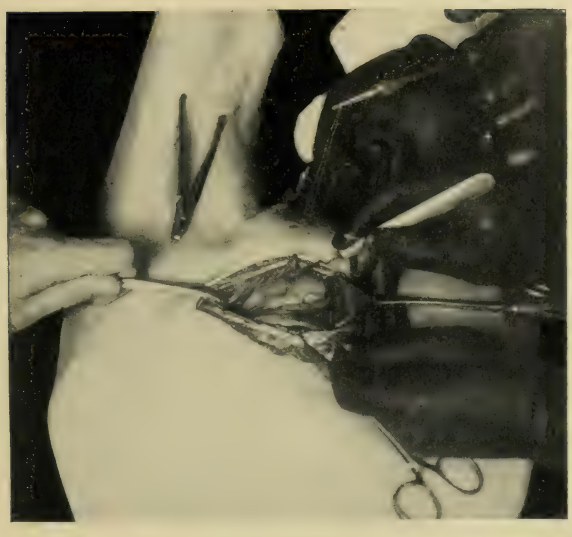

Fig. 5.—The bladder fixed by two guy silk sutures is now carefully opened in a from-side-to-side and layer-by-layer dissection. If the bladder has been emptied, or nearly emptied, beforehand, there will be no escape of fluid and no contamination of the wound, which can be perfectly protected.

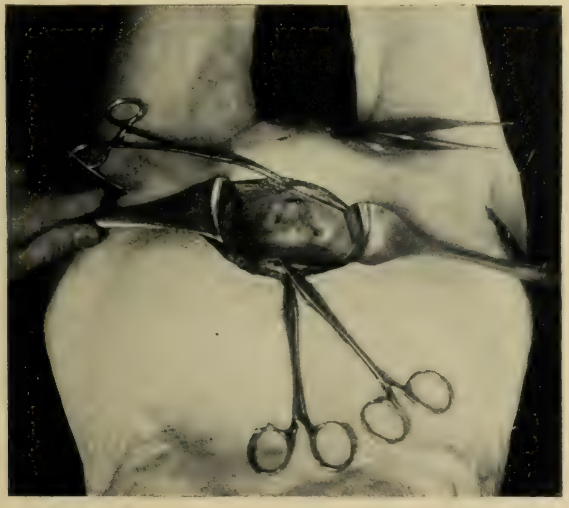

Fig. 6.—After making a longer incision in the bladder, large retractors an inch or more in diameter can be inserted, perfectly exposing all parts of its base, as here shown. In the figure the ureteral orifice is seen darkened by a large hemorrhoidal vessel projecting out of its lumen

Fig. 7.—After concluding whatever vesical operation it has been necessary to do and sewing up the bladder, the recti are approximated by catgut sutures. The first suture is here introduced.

Fig. 8.—The fasciæ underlying the recti and the oblique muscles shown divided and retracted in Fig. 3 are here shown united by suture. A drain has been dropped into Retzius' space to take care of any possible contamination.

operation. It is always unfortunate to be obliged to resort to this expedient, as, if for any reason the wound fails to heal well, the sutured muscles and fasciæ pull apart, a diastasis is formed, and a bad hernia results.

I hit some time ago upon a plan which I believe is a valuable one, and which is new as far as I can ascertain; a plan which obviates the difficulties mentioned and renders the interior of the bladder accessible with the utmost ease. The method will be best illustrated by a running description of the following eight diagrams:

Fig. 1. The patient is put in the Trendelenburg position, after first emptying and cleaning out the bladder, and introducing a mushroom catheter large enough to fill the urethra. A semilunar incision is made through the skin and fat of the lower abdomen about one-inch above the symphysis pubis, concave toward the umbilicus and about six inches long. The small bleeding vessels are controlled.

Fig. 2. The dissection of the upper skin and fat flap away from the deeper tissues is next made, when the deep fasciæ overlying the recti muscles and the adjacent oblique muscles out beyond the semilunar line are clearly exposed in a cleanly manner. It is well to make a good, clean anatomical dissection.

Fig. 3. The next step in the procedure is to divide the deep fasciæ also from side to side without cutting any of the underlying muscular tissues. This division may extend well beyond the recti, as shown in the figure. The fasciæ are now freed from the muscles with the blunt dissection. To effect this detachment it is, as a rule, only necessary to push the gloved finger up between the muscles and fasciæ. In the median line, however, the detachment must be made by means of scissors or a knife.

Fig. 4. When the loosened fasciæ have been drawn up and down, the underlying flaccid recti muscle bellies are exposed and easily retracted to the right and to the left, and this affords an extraordinary avenue of approach to all

the tissues lying between the peritoneum (seen as a roll in the upper part of the wound near the point of the forceps lying across the abdomen) and the symphysis pubis. An inflating rubber bulb is now attached to the mushroom catheter in the bladder and squeezed so as to fill the bladder with air and to bring it right up into the wound. The bladder is the transversely oval, whitish body, with several vessels on its surface at the vertex. The empty bladder exposed and brought up into view and within easy touch in this way is now caught by two guy sutures (Fig. 5) and incised in transverse direction between them. For first recommending this incision I gladly yield to the prior claims of the distinguished French urologist Legueu, who advocated the transverse vesical incision in 1907 (*Presse méd.*, No. 29, p. 226).

If the opening is carefully made, there need be no contamination, as the bladder is held up by the guy sutures and will not sputter its contents into the wound. As soon as the bladder is cut into, the opening is enlarged as much as may be necessary from side to side. There is no danger of contaminating the wound with any infectious vesical contents, which can easily be dried out. The transverse incision is decidedly the best one for the bladder, as it gives the widest possible opening, parallel to the opening in the fasciæ of the abdominal wall, and perfectly avoids all risk of injuring the peritoneum. The incision lies also parallel to and not across the course of the vesical vessels.

Fig. 6. The free exposure secured by such an opening in the bladder is seen in this figure. The base of the bladder is brought perfectly into view and is easily accessible for all operative procedures. In the case before us the urethra, which contains a hemorrhoid on the right side, and the irregularly placed ureteral orifices, come fully and plainly into view. After completing whatever operation the circumstances of the case may demand (Fig. 7) the operator closes the bladder by such method as he prefers, with or without drainage, taking care to utilize the perivesical fasciæ in the outermost

row of sutures and he then closes the abdominal wall down to the little suprapubic drain if one is called for.

By first uniting the recti with catgut and then (Fig. 8) uniting the deep fasciæ of the abdominal wall, leaving room in most cases for a small drain in the median line, the operation is completed.

NOTE.—Dr. T. S. Cullen calls my attention to the similarity between this and F. Trendelenburg's operation, as originally published in his monograph "Ueber Blasenscheidenfisteloperationen und über Beckenhochlagerung bei Operationen in der Bauchhole," Volkmann's *Sammlung klinischer Vorträge*, 1890, No. 355.

There is, however, this most important difference, that Trendelenburg divides the recti, incurring the serious risk of hernia. Trendelenburg, however, deserves the credit for the transverse incision in the bladder, more recently advocated by Legueu.

DISCUSSION

DR. J. SHELTON HORSLEY, of Richmond.—For some time, more than two years, I have been using the Pfannenstiel incision such as Dr. Kelly has described as a routine measure in all suprapubic cystotomies. I find it takes very little more time than the ordinary incision, and leaves the abdominal wall in a better condition. It is practically the same principle as the McBurney gridiron incision, because in using that curved incision we follow the lines of cleavage of the fascia. If you recall, at that point the aponeuroses of the external oblique and internal oblique and transversalis come together, their fibers pointing downward and inward, so that in lifting up the flap, you really are simply splitting the fibers and pulling them apart as you would do in a McBurney incision. These patients can get up within a few days after operation, or almost as soon as the ordinary cases, where a perineal incision is used, and it is almost impossible for them to have a hernia.

DR. ERNST JONAS, of St. Louis.—The Pfannenstiel incision gives a very good view of the bladder, and is well suited for removal of tumors at the base of the bladder. Dr. Charles Mayo has advocated the intraperitoneal method for malignant tumors in this locality. It seems as if Dr. Kelly advocates this incision

also for badly infected bladders. Many of you doubtless know that the Pfannenstiel incision was advocated by Dr. Pfannenstiel for supposedly clean gynecological cases, where no pus in the pelvis was expected. It seems to me that a large gridiron incision of this kind in a case of infected bladder would be dangerous; if the wound gets infected it would undermine the abdominal wall to such an extent that the patient would be a long time in recovering. I understand we can fairly well guarantee good drainage for the first few days by making the drain fairly water-tight, but a few days later, when the drain loosens, the danger of infection is not yet excluded.

Dr. Thomas S. Cullen, of Baltimore.—I wish to draw attention to one point suggested by Dr. Kelly's splendid pictures. In those cases of vesicovaginal fistulæ, where almost the entire base of the bladder is gone and where one or both ureteral orifices lie in the edge of the fistula, one is in a quandary as to how the fistula can be closed without injury to the ureters. I have found that by slitting up the anterior wall of the ureter for from 1 to 1.5 cm. the ureteral orifice is found actually moved back that distance from the edge of the fistula, and the necessary denudation and suture can then be carried out without danger of shutting off either ureter.

Dr. Reuben Peterson, of Ann Arbor.—I think I can answer Dr. Jonas' question from my own experience without waiting for Dr. Kelly to close the discussion. The Pfannenstiel incision, in my opinion, is only good for clean cases. I have had a rather large experience with the transverse incision for shortening the round ligaments and for other pelvic operations, and if the wound suppurates, the objection raised by Dr. Jonas holds good. In infected cases you are apt to get a suppurating abdominal wall, and while the technique, as demonstrated by Dr. Kelly, is fine for clean cases, I can see an objection to its use for the suppurating cases. It is easy to get at the bladder by retracting the abdominal muscles in the way described, or where the peritoneum is open. In fact, it is very surprising how the whole pelvis is opened up, and what a good field you get with this incision.

Dr. George H. Noble, of Atlanta.—I have made use of the transverse incision in quite a number of instances in deep pelvic work and bladder surgery—both intra- and extraperitoneal. For ordinary purposes the incision of Pfannensteil (*A B*), or the extraperitoneal incision described by Dr. Kelly, gives ample room, but for major work requiring the freedom of great working space it is not entirely satisfactory. Extension of the incision upward along the outer borders of the recti muscles (*A C* and *B D*), and cutting these muscles across near the pubic bone, will make a tongue-like flap that can be protected with gauze and

turned into the abdominal cavity, leaving a large opening in the anterior abdominal wall corresponding very closely to the circular outlines of the brim of the pelvis. Such an opening will expose the entire capacity of the pelvic cavity and afford an abundance of room unequaled by any other.

The difficulty encountered in suturing the cut ends of the muscles can be avoided by leaving the posterior layer of the aponeurosis attached to the anterior surface of the recti muscles. It will prevent the sutures tearing out of the ends of the muscles.

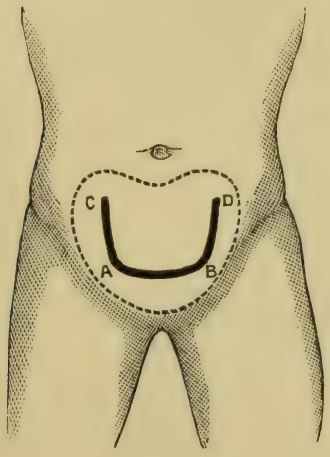

FIG. 1

The transverse portion of the incision should be made as described by Pfannensteil, but a little more curved, and should extend through the outer layer of the aponeurosis, leaving the inner layer uncut (1 to 2). The line of the incision then passes downward between the layers of the aponeurosis (2 to 3) to within three-fourths of an inch of the pubic bone. At this point both recti muscles are cut across (3 to 4) and the line of the incision turned upward between the recti muscles and peritoneum (4 to 5) to the level of the transverse portion of the skin incision where the peritoneum is cut through (5), following the U-shaped or horseshoe incision made on the external surface of the abdomen. In closing the wound kangaroo sutures with needles threaded on each end pass through the lower extremities of the recti muscles from without inward, and are tied on the posterior surface of the muscles in order to make them secure. The two needles then penetrate the distal stump of the muscles and anterior layer of the aponeurosis from within outward at points

close to the pubic bone and emerge on the skin surface, where they are tied. Usually there is no difficulty in approximating the cut ends of the muscles, but if much retraction should take place it can be overcome by elevating the thorax or pelvis for the purpose of shortening the distance between them. The remainder of the wound is closed in the usual way, preferring, however, kangaroo sutures in the aponeurosis.

It will be observed, in following the line of the incision shown on the blackboard (1, 2, 3, 4, 5, the vertical section), that this method makes a "broken joint" and lessens the danger of weakening the abdominal wall. This incision is an immense advantage for extensive operation for carcinoma of the uterus, or resection of the base of the bladder when wide working space is required. I dislike to use it in septic cases on account of prejudice to buried sutures in contaminated wounds, but in clean cases it will greatly facilitate major surgery of the deep pelvic.

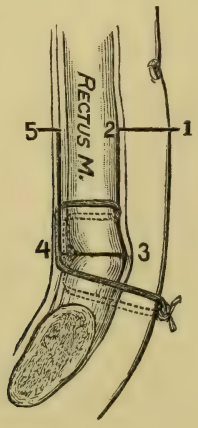

FIG. 2

By modifying this incision, very nearly as much room can be gained with less trauma, but it will require the use of retractors to displace the recti muscle. The change I refer to consists in cutting through the skin, fat, and aponeurosis throughout the full length of the U-shaped incision, then dissecting off the flap thus made from the anterior surface of the recti muscles. When the latter are free from their anterior covering they become quite pliable, and after making the incision in the median line and through the peritoneum, the muscles can be extensively displaced with the aid of retractors.

DR. WILLARD BARTLETT, of St. Louis.—Let me call the attention of the Association to one point which is surely of value here,

and I think it will be fully appreciated, and that is, we owe Dr. Kelly a good deal as an illustrator of scientific subjects. All of you who recollect his presidential address at New Orleans know the great interest he took and takes in this matter. Who else of us would have thought of hanging these pictures in the way he has done? Following the usual custom, we would have reversed them and lost the value of the perspective which we get with the woman in the Trendelenburg position.

Dr. Alexander Hugh Ferguson, of Chicago.—I appreciate very highly this method that has been brought forward by Dr. Kelly today, although I have not carried it out to this extent. Even in cases of infection, whether in the male or female, we have the infection pretty well under control with suprapubic drainage and drainage through the urethra in the female, and drainage through the perineum in the male. I can see at once how this method of exposing the inside of the bladder and exploring it would be of great use in difficult cases to the man who does suprapubic prostatectomy; also in removing papillomata in avoiding the ureter.

One point with regard to the anatomical structures here: we must remember that there is no posterior sheath to the rectus muscle in this region, which facilitates lateral retraction when the anterior sheath is severed.

Dr. Kelly (closing).—I am very much obliged to the gentlemen for their free and fruitful discussion.

I would use this incision in infected bladders, because you can absolutely limit the infection by holding up these guides and making these little windows. Make a little hole, run gauze in, dry it out thoroughly, and after that, if you are careful with packing, there is no possibility of contamination of the surrounding area during the operation. Many of the infected cases on which we operate can be cleaned out quickly. You can take out a large stone from the bladder in a case that is infected; you can thoroughly wipe out the whole bladder with a 5 per cent. solution of nitrate of silver, close up with a drain in the bladder in the male, and in the female make a stab drain, and there is no chance of spreading the infection. When you come to bad cases of papilloma or carcinoma of the bladder, you might do it some other way, but when you know how to do it this way, you have to do it this way. By the use of such an incision plenty of room is obtained, and you want all the room you can get. In bad cases of cystitis I have cut out half the bladder for extensive ulceration, and lots of room is wanted in order to do a good, clean, thorough-going operation and to control hemorrhage, and this you can control perfectly by means of this incision. I have never known any disadvantage from making the transverse Pfannensteil incision in such cases.

STONE IN THE URETER

By R. C. Bryan, M.D.
Richmond, Virginia.

Stone in the ureter is a much more prevalent condition than is supposed. Many Röntgenologists pronounce them to be of greater frequency than renal calculi. According to Leonard, 50 per cent. of all calculi occur in the ureter. This is not an extravagant statement when we recall that ureteral calculi may arise *primarily* when this tube, by reason of internal or external insults, suffers a congestion, displacement, or physiological embarrassment.

And *secondarily* from the kidney, where all stones originating, attempt at some time in their life's history to enter the ureter and thus gain the outer world. Ureteral stone is usually single, at times multiple, exceptionally bilateral. Multiple stones occur, according to Tenny,[36] once in eight times of ureteral calculus.

The following series are the cases which the writer wishes to report, with observations derived therefrom.

Case I.—June 1, 1910. Referred by Dr. Nelson. C. M., male, aged twenty-six years, agent. Until six months ago was perfectly healthy; denies venereal disease or any infectious disease. On Christmas day, 1909, he had a severe pain in region of the left kidney. A physician called in pronounced it kidney colic, and gave him morphine. Aside from a little soreness and occasional discomfort, aggravated by rough travelling, jolting, buggy riding, etc., the patient attended to his work (sales agent) until May 28 of the

present year, when he had another very severe attack of pain in the small of his back and left side, which radiated to the glans penis. Urinalysis showed nothing of any significance (probably on account of the apparent complete obstruction found at operation).

Cystoscopy in this case was not performed. *X*-ray by Dr. Gray (see Fig. 1, Case I) showed stone opposite first lumbar, vertically situated, about the size of a black-eyed pea. This patient never noticed any blood in the urine, nor was there a pollakiuria, pain being the only one of the three cardinal symptoms which was present, there being only two distinct seizures of these, six months apart; in the interim, the soreness and distress in the small of the back, though constantly present, was never of sufficient grade to make him stop work.

June 4. An extraperitoneal lumbar incision exposed the kidney; the stone was found impacted, wedged in the ureter about three and one-half inches from the pelvis, which proximally was dilated and thickened to the size of the little finger. Incision over the stone, which was removed; two small 00 catgut sutures approximating the ureteral wound; drainage tube to site, which never conducted any urine to the surface.

June 19. Went home.

July 30. Wound entirely healed.

October 30. Patient reports that he feels splendid, no urinary symptoms of note, no pain, no discomfort, and urinalysis negative.

Remarks: 1. Characterized by pain, two attacks.

2. The absence of significant epithelia and cellular elements accounted for by the apparent complete blockage of the ureter, although the kidney appeared perfectly normal and there was no thickening or distention of the pelvis.

3. Though the stone was impacted at the time of operation, it must have been playing as a ball valve, allowing an intermittent escape of the urine. The first attack of

colic arising when the stone became engaged in the ureter. The second likely with the development of a transient hydronephrosis.

Case II.—March 16, 1910. Referred by Dr. W. R. Jones. W. G. P., male, aged fifty-seven years. Always enjoyed good health until six years ago, when he had a growth removed from the larynx which was pronounced cancer.

Two years ago had kidney colic on the left side requiring morphine. Has had no such attack since, but has constantly an uncomfortable sensation along the course of the left ureter, which is localized in the left lumbar region and unreflected.

For three months has been noticing blood in the urine, which is mixed with the urine, is not terminal, and darkens the urine at each act. Believes the blood comes from the kidney.

Examination: Tall, anemic man, prostate normal, no adenopathy, bladder irrigated with adrenalin. Capacity, fourteen ounces. Left ureteral mouth somewhat congested and pouting, little reddish; clouds seem to emit from the orifice. No. 7 F. ureteral catheter inserted with no difficulty as far as renal pelvis, which, with the ureter, are thoroughly flushed out with adrenalin solution and boric acid. Right ureteral os normal. Instrument removed. Patient allowed to walk home. *X*-ray in this case negative. Urinalysis not carried out on account of discoloration.

April 1. From 9 p.m. to 2 a.m. experienced a severe attack of pain in region of left kidney; stone passed, heard to click in the vessel but was not secured, although he had been warned to look out for it. The relief was immediate.

October 20. There has been no blood since April 1; there is perfect comfort, and the patient feels better than at any time since the trouble began two years ago.

Remarks: This case was characterized essentially by hematuria, and though there was no urinalysis made and *x*-ray was negative, there seems to be no reasonable doubt

but that the trouble was stone in the ureter. This is an instance where the catheter easily slipped by the stone. How this occurred will be referred to later.

Case III.—May 21, 1910. Referred by Dr. J. G. Nelson. S. M., male, aged forty years, colored, laborer. Has two children. Thirteen years ago contracted gonorrhea, pronounced cured in a short while, no complications. For ten years has had some pain in back about region of kidneys, probably a little more on the left than on the right, but no history of a distinct attack of kidney colic. During this time has frequently had in the act of urination discharges of a whitish material which felt gritty between the fingers. At times this comes away in lumps. Has never noticed any blood in the urine, nor is there any pain on the passage of this grit. Recently the discomfort in the back and about the kidneys has been so distressing that he has been unable to do any work. This pain is well localized over the kidney region, of a dull burning character, does not radiate to the testicle, penis, or thigh, and is relieved in a measure by recumbency and heat. He has found out from experience that drinking large quantities of water daily also helps the pain. He urinates no more frequently by night than formerly, but very frequently during the day, probably every hour or so.

Examination, May 28: Short, compact, healthy man. Prostate normal, somewhat congested; vesicles normal.

Cystoscopic: Bladder capacity eighteen ounces, urethra takes 23 F.; bladder mucosa healthy. Right ureteral mouth normal, left pouting, edematous, crater-like. Peripheral injection; ureters not catheterized. From the appearance of the left ureteric mouth stone is suspected. *X*-ray by Dr. Gray, May 30, shows there are two stones in the left ureter anterior to the sacro-iliac joint, the larger below and the smaller above (see Fig. 2, Case III).

Urinalysis, Dr. E. G. Hopkins, pathologist, Virginia Hospital: Amber alkaline, 1024, chlorides, phosphates normal, indican considerable, blood small amount, pus, few cor-

puscles; crystals, calcium, oxalate, and ammonium, urates very abundant, phosphates considerable, no casts, epithelial, renal pelvis and bladder few.

Diagnosis: Suggests stone.

June 4. Patient reports having more pain than usual in loins and some radiating to the head of the penis; decides to go to the hospital.

June 10. Under chloroform anesthesia, the catheterizing cystoscope being somewhat painful, the left ureter readily catheterized; at about five inches a slight obstruction is felt. This is shoved by, however, and the pelvis of the kidney is gained. A warm sterile olive oil solution with adrenalin, 1 to 20000, is injected into the pelvis, and as the catheter is being withdrawn this solution is forced in; the globules of oil returning into the bladder are immediately noticed; when the catheter is within one inch of the mouth of the ureter, the solution is squirted forcibly into the ureter and held so for a minute or more. An interesting point is here noted, the pouting ureteral mouth becomes more swollen, the mucous membrane cloud-like and more puffy, the instruments are withdrawn, and the patient returned to bed.

June 14. Passed a little round, soft stone about the size of the head of a pin.

June 18. Has been feeling more comfortable than for some time, the pain in the back much better.

June 25. Passed another small stone on June 23, and has been passing at intervals mortar and grit. On the morning of June 23 had severe pain in back and had to go to bed.

June 27. At 9 A.M. had the most severe pain yet, in same place (small of back and in region of bladder). Hot water bag and enema relieved same. At 8 P.M. voided a stone which was caught in meatus and removed with fingers.

November 10. Patient reports that he is perfectly well, has had no pain, and has noticed none of the gritty substance since the stone voided on June 27.

Remarks: Characterized by pain and frequency of urination. The pain localized in the back, constant, of a dull burning character, and not radiating. The occasional paroxysms although great, never produced vomiting, profound shock, or required morphine. The pollakiuria is most significant and of great diagnostic value. It would appear to be nature's method of subjectively attracting the patient's attention. The nervous control of the bladder and the lower segment of the ureter are intimately intermingled and the patient is unable to tell whether the pain is in the bladder or in the ureter (or in the kidney for that matter); the character of the pain is the same in all three places.

Since the stone, judging from its size, filled the ureter pretty snugly, it is a question how the catheter No. 7 got by it. Several explanations may be offered.

1. It may not have gotten by, but doubled in the ureter (for there was no bulging in the bladder). This would seem, however, improbable.

2. The stone may have been lying in a diverticulum of the ureter, the catheter crowding by it.

3. It may have been shoved up to the kidney to drop down on the removal of the catheter. The caliber of the stone is approximately 11 F. The pouting and dilated ureteral mouth, therefore, stood in very good stead for its passage.

4. This is the only instance of stone in the ureter in the colored race that the writer knows of.

Case IV.—January 20, 1911. Referred by Dr. F. K. Lord. Miss E. W., white, aged twenty-three years, single. Denies diseases of childhood, typhoid, or any infectious diseases; always enjoyed good health until six years ago, when she was operated on for appendicitis. She has had several attacks of this pain, which were localized in the right hypogastrium, of severe character and constantly attended with vomiting and prostration. One year later, on account of the continuance of the pain, she underwent another operation for adhesions, the incision this time being made in the

median line. Another year later she was operated on again at the same site for supposed buried suppurating sutures. For six months did well and was free from pain. It was now that she developed a seizure on the left side. The pain was so great that it required morphine. Since then she has had many such attacks there being in nearly every instance a temporary suppression followed by retention requiring catheterization. On several occasions she has noticed blood in the urine, and on one occasion she thinks she voided a small stone. Following this for a short while there was considerable relief. Six weeks ago had a violent paroxysm of pain on left side, with the *formation of a tumor under the ribs*. This attack was so severe that it required the constant attention of a physician for twelve hours. Four weeks ago, on December 20, she was taken to the Sheltering Arms Hospital, Richmond, Va., for packed bowel. Discharged in ten days.

Examination: Large, angular, anemic girl, distended and flabby belly wall, particularly sensitive about the left kidney and along the course of the left ureter. Left kidney palpated with difficulty, adhesions, gastrocoloptosis and intestinal stagnation evident.

January 25. Cystoscopic: Right ureter pouting, dimpled, fluffy, crater-like. Left normal; right catheterized, No. 7 going easily to the pelvis. Specimen examined by Dr. E. G. Hopkins showed amber, 1012, neutral, trace of albumin, chlorides normal, phosphates diminished, indican, urates no excess; sediment, $\frac{1}{4}$ of 1 per cent. Blood, small amount; pus, few corpuscles. Epithelia renal and pelvic considerable.

Remarks: Suggests renal calculus.

January 25. *X*-ray by Dr. Gray, stone along the course of and most probably in ureter.

January 26. Right kidney catheterized, stylet inserted; *x*-ray taken again, shows stylet tangent to stone (see Fig. 3, Case IV).

FIG. 1.—Case I. (Man.) Apparent ureteral block at operation, but no pelvic distention or renal involvement. Left side

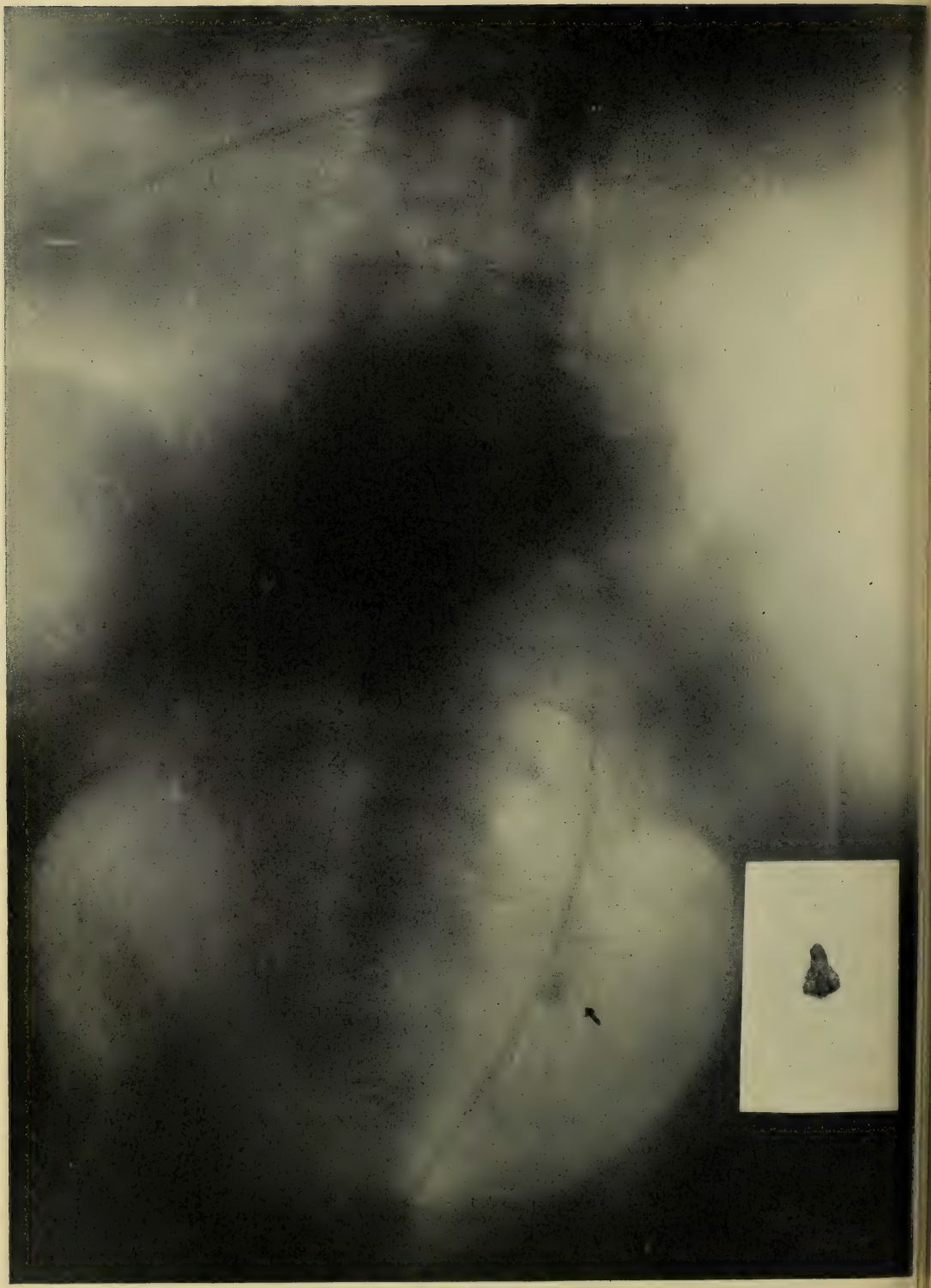

FIG. 2.—Case IV. (Woman.) Ureteral stylet tangent to stone. The stylet on the left side goes only five or six inches. Right side.

February 17. Chloroform anesthesia, incision parallel to and above Poupart's ligament from two inches above anterior superior spine to spine pubes. Ureter found adherent to reflected peritoneum, much dilated and thickened, size of little finger. The ureter felt and stripped from renal pelvis to bladder; no stone found. The explanation at the time was that it had been crushed in catheterization or that it had slipped into the bladder. The intramural ureteral segment was not palpated. Catgut sutures and silkworm gut through the skin.

February 19. Many angular, sharp fragments voided, all of them white and of the same size. This continued until February 27. By this time there had been enough manufactured out of this stone quarry to fill both hands. They had been proved by the second day of their passage to be plaster from the wall.

February 27. A very severe attack of kidney colic on the right side requiring morphine, then chloroform. Along the side of an 18 F. examining cystoscope a small male olivary metallic bougie, size 11 F., was slightly bent with a gentle curve and easily shoved into the ureteral mouth and up about two inches, where it was greeted by an unmistakable metallic click. Several other doctors assured themselves that a stone of probably dense formation was certainly present.

March 1. Bladder cystoscoped, bougie introduced again into the ureter to site of the click and held there by an assistant. The former incision now opened up. The end of the bougie felt in the ureteral wall the stone located about one inch from the posterior wall of the bladder; incision made over it, and the calculus removed. The ureter brought together with two No. 00 catgut sutures, rubber drainage inserted through tissue to ureter, and the belly wound sewed.

March 3. A few drops of urinary drainage.

March 8. No urine discharged through wound since March 4; no blood in urine.

March 11. Up in chair.

March 28. Goes home.

October 16. Has had no trouble since discharge from hospital, and claims to be in better health than she has been since childhood, having gained some 30 pounds and going to work daily.

Remarks: 1. Characterized by pain and retention of urine. Was the original attack of appendicitis the lodging of the stone at the iliac juncture?

2. Were not the subsequent attacks of abdominal distress demanding operative intervention but the expression of this incarcerated foreign body changing its position?

3. Why should this pain have been formerly in the right and during the last two years referred only to the left kidney and ureter?

4. The flat arrowhead shape of the stone and capacious ureter explains how the catheter got by it so easily.

5. Sounding stone in the ureter (of the female particularly) would seem to be an infallible clue to diagnosis.

6. The operator made a great mistake in not sounding the entire length of the ureter at the first operation. This should always be done, and has been a method of routine in subsequent cases for a possible secondary stone.

Case V.—September 22, 1910. Referred by Dr. E. G. Hopkins. L. E. W., male, aged forty-three years. Venereal history negative. Ten months ago, about the first of the year, began having frequent urination, no pain, no blood, no mucus, simply has to make water about every half hour at night and every forty-five minutes during the day, which has so disturbed his rest that he is now unable to attend to his work, that of telegraph operator.

Examination: Rather small, anemic man, thin and pale. Prostate normal, urethra normal, stone search, negative. The patient has noticed for some time past that drinking large quantities of water seems to help him, so he consumes about three quarts daily.

Urinalysis made by Dr. E. G. Hopkins, pathologist of Virginia Hospital, shows amber, 1016, alkaline, albumin considerable, sugar negative, chlorides normal, phosphates diminished, indican no excess, blood bulk of sediment, pus, few corpuscles, mucous slight excess, casts negative. Epithelia probably, ureter in clumps and bladder, no tubercle bacilli present.

Remarks: Suggests stone in the ureter or bladder.

September 26. *X*-ray by Dr. Gray shows a small stone about the size of the head of a match in the left ureter about four inches from the ureteral mouth (see Fig. 4, Case V).

October 13. Under chloroform anesthesia whirlpools of reddish clouds seen emitting from left ureteral mouth, which cannot be distinctly seen on account of the red medium. With much difficulty the ureter is catheterized; no obstruction or impediment is noted; the catheter is inserted to the pelvis of the kidney, which, with the ureter, is flushed out with warm boric acid solution and adrenalin 1 to 20000.

October 16. Urine still stained with blood, but patient feels better and is allowed to go home.

October 24. No blood in the urine now, up three times during the night and about every three hours during the day; feels sore from the instrumentation, but much better otherwise.

November 1. Another *x*-ray by Dr. Gray shows no stone or shadow.

November 6. Gets up once at night and urinates six times by day. The soreness from catheterizing cystoscope practically gone, feels better than at any time since the trouble began, has gained in flesh, and has returned to work.

Remarks: This man strained all urine through cheese cloth from the time of leaving the hospital to the present time, and there has never been any debris or grit suggestive of stone. It may have been expelled and lost during his stay in the hospital. There seems to be no evidence of its presence now.

Case VI.—October 31, 1910. Referred by Dr. W. S. Robinson, Danville, Va. W. G. P., aged thirty-five years, single. Three years ago had attack of severe pain in the region of the right kidney. Seven months ago had a similar attack on the left side. Has had slight attacks very frequently, and has constantly a soreness in the region of the bladder. Does not make his water very frequently, but has noticed blood in the urine on numerous occasions.

Examination: Stout, pasty, unhealthy-looking man; kidneys not palpable, no pain on pressure over region of kidneys or along the ureter. *X*-ray by Dr. Gray shows three shadows on the right side and *two* on the left, about the location of the ureter at the ischial spine. But on account of the *penumbra* and the rather external position are thought to be most likely phleboliths or calcified glands (see Fig. 5, Case VI).

Cystoscopy: Bladder large, capacity 20 ounces, mucosa perfectly healthy, right ureteral mouth normal. Left ureteral mouth *slightly* injected, not edematous or pouting. Diagnosis of stone cannot be confirmed from the appearance and condition of this mouth. Left ureter easily entered with No. 8, the catheter going readily to the renal pelvis without pain or discomfort. Specimen from left kidney shows, per Dr. E. G. Hopkins, light amber, cloudy alkaline, albumin abundant, no sugar, chlorides normal, indican no excess. Blood, considerable proportion; pus, few corpuscles; mucous, no excess; crystals calcium phosphate considerable, amorphous matter, granular debris. Casts: fine granular, few; coarse granular, abundant; brown granular, few. Epithelia renal tubules and ureter abundant.

Diagnosis: Chronic diffuse nephritis.

Remarks: We state above that the catheter goes to the pelvis without pain or discomfort. Catheterization of the normal ureter is absolutely non-painful, and in the large number of instances the patient is unaware of the instant when the catheter goes into the ureteral mouth. In other

instances it may be likened to the slight discomfort experienced by a urethral catheter crowding its way through the external sphincter. If actual pain is elicited at any point along the course of the ureter, we are immediately suspicious of stone, stricture, or ulceration at that point.

Case VII.—February 10, 1907. L. G., aged twenty years, for several years has had frequency of urination, getting up at night three to four times and every hour or so during the day. This is in a measure due to large quantities of water which are taken daily, as he has found out that the soreness and discomfort in the left side is helped considerably by this treatment. Three weeks ago he had a severe attack of pain in the left side, which required morphine hypodermically. At the time of the attack he made no water and did not for several hours following. Has never noticed any blood in the urine, nor has he seen or felt any gritty particles.

Examination: A tall, thin boy; no tenderness over the left kidney, which cannot be felt. Tenderness elicited on pressure over region of the ureter where it crosses the iliac artery.

Cystoscopy: Bladder capacity large. Right ureteral mouth normal, left ureteral mouth edematous and puffy, white concentric ring of congested mucosa about the orifice. On catheterization of left ureter the catheter is abruptly stopped about four and one-half inches from the os. On trying to shove the catheter farther up the ureter, the pain is so great that the procedure has to be abandoned. No *x*-ray taken.

Urinalysis shows some red blood cells, pus and epithelia of the caudate variety. Patient is sent to hospital for operation. Two nights later, after being prepared for operation, with cathartics, high hot enema, and encouraged to drink large quantities of water, he was seized with an exceedingly sharp, lancinating pain, which continued for thirty minutes, stopping as suddenly as it began. The next morning

the stone, approximately 11 F. in caliber, was voided in a vessel after some little straining and bearing down (see Fig. 6, Case VII).

Newman[31] reports a similar case.

In this instance the diagnosis was made essentially from the history and impassable ureteral obstruction and the appearance of the ureteral mouth. The attempted catheterization so disturbing the stone's position that increased urinary function, catharsis, and high enema paved the way for its expulsion. It hardly seems possible that a stone of such size could escape through the ureteral orifice and along the entire course of the ureteral canal without becoming arrested. Young reports a case of stone impacted in the intravesical portion of the ureter ulcerating its way through and falling into the bladder, the patient making a complete recovery.

Case VIII.—September 22, 1910. Referred by Dr. E. C., Fisher to Dr. H. S. MacLean and the writer. J. F., travelling man, aged forty years. In December, 1908, contracted a bad cold, confined to bed for three weeks with suppression of urine and pain about the left kidney. Later, got back to work, but has not been feeling well, pain continuing in the left side and flank and radiating to the testicles. Recently the attacks of pain have been so severe and frequent that he decided to go to the hospital and have something done. He has frequently noticed clots in the urine, and also that riding and driving aggravated the trouble.

Examination: A big, anemic man, pain over the left kidney, no tumor felt.

Urinalysis: 1026 a. c., no casts, some pus and red blood corpuscles; no crystals. Three *x*-ray exposures negative.

September 24. Cystoscopy: Bladder capacity fourteen ounces. Right ureteral mouth normal, left ureteral mouth normal. Ureters not catheterized on account of shock and pain. Phenolsulphonephthalein test first hour, 37 per cent.; second hour, 17 per cent.

September 29. Left lumbar nephrotomy, many dense adhesions about the pelvis, a stone felt in the pelvis. Incision was made along the convex border of the kidney and the finger thrust through into the pe vis finds it empty. The external finger feels the stone however, and shoves it up into the pe vis proper, it having been lying in a pocket or diverticulum of the proximal end of the ureter (see diagram figure). It is now removed through substance of kidney, mattress sutures, stone proves to be pure fibrin and shows no nucleus on examination, consequently throws no shadow (see Fig. 7, Case VIII).

This case is of great interest. The attack in December, 1908, was evidently an acute hemorrhagic nephritis, the agglutination of the fibrin giving rise later to stone simulation. How this concretion, by its very light weight and smooth surface, bulged out the upper end of the unyielding ureter can only be conjectured:

1. By traction diverticulum.
2. Congenital weakness.
3. Ureteral stenosis.

December 1. The patient has been home for a month, and is enjoying greater relief than he has had since the trouble began two years ago.

The anatomy of the ureter will bear on our discussion, and some of the more important features will be discussed now.

The ureter, 12 to 13 inches long, and 4 to 5 mm. in diameter, courses vertically in its paravertebral bed on the psoas muscles from the lower level of the first lumbar to the sacroiliac articulation to which it runs accurately anteriorly. It now seeks the level of the ischial spine, bends inward and downward, and empties into the bladder about one and one-half inches distant from its fellow of the opposite side; and its mouth protected by a closely woven reduplication of the muscular wall of the bladder effectively prevents, except in instances of replacement fibrosis, the regurgitation of all vesical fluids.

The arterial supply is most generous. Sampson has shown that the ureter may be dissected out from the kidney above to the bladder wall below, and suffers no necrosis by virtue of this intimate and kindly intramural inoculation. According to Leonard, this explains also how a stone may be impacted in the ureter for months or years, causing no erosion or disintegration of its walls. The normal caliber, though 4 to 5 mm., has three points of anatomic stenosis:

1. At that point where the pelvis of the kidney becomes the ureter averaging one-twelfth of an inch in diameter.

2. The point of crossing the iliac artery averaging one-fourth of an inch.

3. The opening of the ureter in the vesical wall averaging one-tenth of an inch.

Thus, we note that nature's tightest barrier is the first stenosis, one-twelfth of an inch. Freyer[14] states that clincally a stone is arrested (1) at a point 2 inches from the commencement of the ureter, (2) at the brim of the pelvis, and (3) at the vesical end of the canal.

Schenk[34] tabulates 84 operative cases; the position of the stone was found cited in 81. In 19, or 23.4 per cent., the calculus was located within 6 cm. of the kidney; in 8, or 9.8 per cent., at or near the pelvic brim; while 41, or 50.6 per cent., were found within 5 cm. of the vesical opening, leaving but 16.2 per cent. for all other locations.

Moschwitz[29] finds the same occurrence of impaction.

Fenwick[10] says that stones are arrested in the ureter more frequently in the upper portion, and with about equal frequency in the middle and vesical portions.

If the stone slips through this first physiological contracture, unless its descent is very low, its size much aggravated by crystals and mucous shreds, it should descend to the vesical mouth, where good fortune expels it into the cavity of the bladder, or, on being arrested in the ureter, it gives rise to a train of clinical symptoms not unlike stone in the kidney or in the bladder. Between these constrictions the

lumen is dilated; dilatations and constrictions are complimentary and instanced in every mucous tube of the body.

The nerve reward is also highly indulgent. Byron Robinson has shown that there are three points of rich anastomosis:

1. Where the plexus ureteris and the ovarian or spermatic coalesce, explaining by irritation ovarian pain, retraction of the testicle, and also that of intolerable itching in the glans penis.

2. Where the plexus ureteris and plexus uterinæ solidify explaining uterine and vesical disturbances.

3. Where the plexus ureteris and that covering the iliac artery unite, which on irritation accounts for the referred pain in the knee and thigh.

The formation, retention, detection, and removal of stone from the kidney has long since been perfected, as also has been stone in the bladder. That calculus formed in the kidney may slip into the ureter, and remaining there, give rise to abdominal crises, paroxysmal outbursts, and profound constitutional upheavals through years without detection, or even suspicion, has been unfortunately only too frequently instanced. If the kidney is the originator of all ureteral stones, why is it that we so frequently find only one stone? According to Leonard[21] calculus in the ureter is more frequent than renal stone in the proportion of 3 to 2.

Etiology and Pathology. The ureter is an extraperitoneal vertical tube; it possesses only a linear mesentery, is constantly undergoing its rhythmical peristaltic contraction, and, on account of its proximity to the intestines, crossed by the ileum on the right and that large cesspool, the caput coli, but a little to its outer side, and behind the sigmoid, on the left; the possibilities of transmural bacillary infection must be considered as a constant menace to the ureteral integrity, particularly if its mucosa has been insulted by the frequent passage of a concentrated urine loaded with irritating crystals such as oxalate of lime; or if, indeed, its

wall has either mechanically or by processes of inflammation been restricted or damaged, as may be instanced in childbirth, appendiceal, ovarian, tubal, and peritoneal exudates, and consequent fibrotic replacements.

Ureteral stone may be any size. Bovée removed one $2\frac{3}{4}$ by $1\frac{3}{4}$ by $1\frac{1}{2}$ inches successfully.

Males are more frequently the victims than females, according to Morris[27] two to one. This may be explained in a measure by the anatomical difference in the urethra in the sexes.

The right side would seem to be more frequently affected than the left, this obtaining particularly for women. May this be explained by the preternatural mobility of the right kidney, the traction of the nephrocolic ligament of Longyear, the consequent angulation of the renal vessels, increased blood pressure, enfeebled capillary circulation, and minute kidney hemorrhages? In our series one stone was found on the right side, that in the only woman, the remainder on the left.

The determining cause in stone formation is a precipitation of crystals. The character of the food, metabolic changes, occupation, and habits predispose to their crystallization. Microscopic at first, the exciting cause continues and the minute calculus grows. It may now escape through the urinary channels with no symptoms. Its increase in size is slow, its presence is unknown; now and then it engages in the ureter, giving rise to kidney colic. On one occasion, because of its further intromission, irregularity, and sharp angles, it becomes incarcerated, inflammation, reaction, and swelling of the mucosa ensues, which causes a thickening and rigidity of the ureteral walls with the production of a pathological stenosis at that point, and that profound train of symptoms is initiated which constitutes "stone in the ureter."

Or the ureter, distorted and kinked by a dislocated kidney and general visceroptosis, with the consequent traction of mesenteric dislodgement (for it might be recalled that the

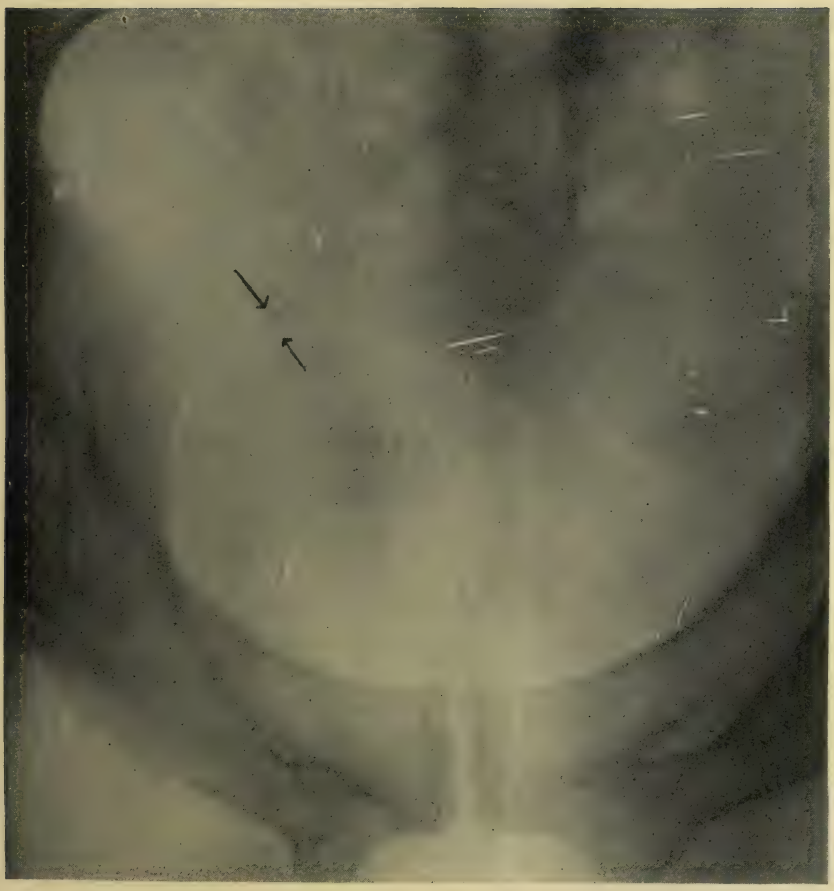

FIG. 4.—Case V. (Man.) This stone dislodged by the ureteral catheter and later voided. Left side.

FIG. 5.—Case VI. (Man.) The shadows in this case simulate strongly stone, but on account of the external position and the penumbra were pronounced phleboliths.

Fig. 6.—Case VII. This stone dislodged by the ureteral catheter and later voided.

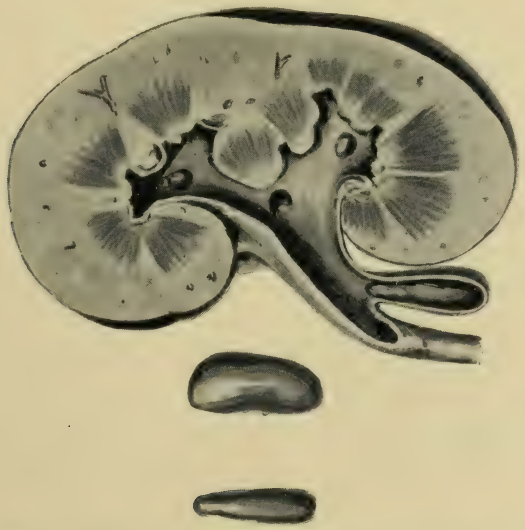

Fig. 7.—Case VIII. (Man.) Diverticulum of the ureter filled with a stone of pure fibrin, no nucleus.

Fig. 8.—Case IX. To illustrate the tolerance of a clean pelvis to stone. Stone snugly filling pelvis of the kidney and upper outlet of the ureter, never giving rise to any pain.

mesenteric attachment posteriorly is linear, and runs from the left margin of the second lumbar vertebra to the right iliac fossa; it thus crosses both ureters), produces an elongation and stretching of its cross fibers, weakens the normal support which the ureter has anteriorly, a weakened wall, bulging or traction diverticulum is instituted, which, catching crystal-laden urine, cell detritus, and later inviting infection, gives rise to primary stone formation.

Kelly reports a stone originating primarily in the ureter about a silk ligature.

The list of intra-abdominal pathological lesions which can by virtue of inflammation have a direct influence upon, or jeopardize the normal physiological activity of, the ureter is necessarily numerous, too numerous to take up in detail. They are all based upon the same principle, that of an organized exudate, which on contraction presses upon or drags the ureter out of its normal bed, and thus interferes with its healthy behavior.

As another and more recently developed causation of primary ureteral stone, must be mentioned *stricture*. The acquired variety has been briefly mentioned above. The *congenital*, Bottomley* records 56 cases of congenital stricture of the ureter. Such a stenosis, if complete, would result in atrophy of the kidney or hydronephrosis; if of small caliber there would be proximally a dilatation and thickening of the ureteral wall. The opportunity here, through stagnation, for stone building would seem evident and is directly comparable to stone formation in a bladder behind an obstructing prostate.

Symptoms and Diagnosis. There are many cases of renal calculi which give no symptoms (Case IX, Fig. 8), the condition being recognized only at autopsy.

Case IX.—This case is to illustrate this point in question. R. E. C., aged twenty-six years, clerk, single (patient of

* Annals of Surgery, vol. v, lii.

Dr. S. N. Michaux, by whose courtesy history is given). In September, 1908, had some *discomfort* in right side. From then to September, 1909, has never had any seizure or even pain, but was constantly conscious that he "was not right under the ribs." The urine scalded and burned some, palpation over the kidney was painful. *X*-ray positive, nephrotomy gave stone an accurate cast of the pelvis and ureteral outlet.

It is worthy of note here that in the one year's history of this stone's growth to the point where it seemed to fill completely the renal pelvis proper and the upper outlet of the ureter, there was never any colic or abdominal outbursts, and in the absence of infection the pelvis had established a tolerance.

Again we must bear in mind that stone may arise in a diseased as well as in a healthy kidney. In this event there may be present distress and pain from the renal lesion as well as that which is caused by the presence of the stone itself. It is not our intention to dwell upon surgical kidney, perinephritic abscess, and the constitutional manifestations caused by renal suppuration complicated by stone, but to limit our remarks only to stone as found in the ureter arising there *de novo* or manufactured above in a kidney whether it be healthy or diseased.

Microscopic findings of a pathological kidney, then, must not be confounded as a concomitant phenomenon, or significant of ureteral calculi, for renal epithelium even under favorable auspices is difficult to differentiate from that of the ureter—casts are significant of kidney lesion, not ureter; blood and pus may come from either. Repeated painstaking and deliberate urinalyses should be most carefully carried out. The constant presence of cellular elements, crystals, blood, and pus cells in the absence of renal products and negative bladder findings, should put us on our guard. For there is no one factor that is positive of stone. It requires a minute dissection of an obscure history, one complicated by abdominal neuroses, paroxysmal outbursts of pain in

almost any quadrant of the abdomen, and a peculiar obsessive apathy on the part of the patient to give any direct clue to the cause of the trouble. Many operations for appendicitis have left the offending stone behind in the kidney or ureter to give rise subsequently to renewed attacks.

The writer would emphasize here again that stone may be carried indefinitely in a healthy pelvis or ureter giving rise to no symptoms. At that physiological instant, however, when by virtue of shifting its position in the pelvis, acting as a ball valve, the stone produces a kidney block, a train of symptoms are brought forth, the more prominent of which is pain. This pain can neither theoretically nor practically be differentiated from the pain of incarcerated stone in the ureter, for in both instances the onset, though gradual, rapidly reaches the climax and continues so until the stone shifts its position, relieving the block, or the ureteral wall, tired out by its muscular effort, relaxes, allowing a temporary respite. In both instances the pain is intense and most severe, referred to the kidney region, the pit of the stomach, about the bladder, or courses along the ureter. In both there may be a renorenal reflex with consequent anuria. In both, temporary hydronephrosis may supervene, and in both the trauma and reactionary hyperemia give rise to hematuria.

Fenger[9] says "pain with stone in the ureter is not characteristic, as the same fixed pain is found in nephrolithiasis, pyelonephritis, and neuroses. Pain may be absent entirely, and in some cases no symptoms of stone in the ureter have been present until dilatation of the pelvis, cystonephrosis, develops."

The patient is profoundly prostrated by the seizure, which continues from a few minutes to several hours (Case IV). These attacks may come on frequently or not in months. There seems to be no rhyme or reason for their outbursts.

Stone once engaged in the ureter tends by gravity and hydrostatic pressure from behind to gain the bladder. Its

progress downward is usually slow. Hagner reports a case of an excursion as far as the vesical segment taking twenty-six years. Young reports one taking fifty-six years. If the ureter is not blocked the excreted urine acts as a fluid wedge and helps in its passage. If there is complete blocking, atrophy of the kidney occurs, the stone remaining *in situ*, probably later to break through the ureteral wall. The writer, however, knows of no such case. In Case I there was seemingly a complete block, the stone being wedged densely in the ureter. The kidney, however, was secreting normally and did not appear to suffer in the least from this distal resistance. When once the stone has moved on, the ureter remains dilated proximally to the stone. Its walls, weakened by this internal pressure, allowing the stone to pass along, are now kept in this bulged-out condition by the urine dammed back behind the stone.

When the stone comes in contact with the various plexuses along the course of the ureter, new and independent pains arise, which are referred to the ovary, glans penis, testicles, knees. The pain of the stone itself is that produced by pressure on the ureteral wall, the pain of tension. It is also dependent upon the composition of the stone, the oxalate of lime appearing to produce the worse attacks and uric acid the least severe.

It is in the transmission of the stone also that occasional anuria may arise. This is due to transient "kidney" with a renorenal paresis. It would seem that a very keen dissection of a suitable case could furnish us sufficient clues to allow a venture of diagnosis where the stone would be found at operation, for it is at the pelvic brim that the irritation of the iliac plexus gives rise to the referred pain in the knee and thigh. In the lower segment the vesical disturbances now become more marked and there is a frequent and annoying pollakiuria. This is produced in two ways—by ureterovesical irritation and by a ureterorenal stimulation, vasomotor disturbances, with consequent greater output.

Were a stone to be of such a size as to pass from the kidney to the outer world, giving rise to no pain, there doubtless also would be no blood found even on microscopic examination. A stone large enough to produce pain is also large enough to lacerate and injure the ureteral mucosa. Hematuria, then, is a symptom which we constantly expect to find present. And its intermittent appearance would seem to be directly dependent upon the roughness of the stone and its changing its position in its progress downward. With laceration and pressure necrosis, pus cells now put in their appearance, the stone passes on from this inflamed area, which heals over, and the pus disappears from the urine. Minute particles of the stone are constantly swept away and show themselves as crystals recognizable by the microscope.

With the pelvic congestion of the menstrual period we would expect an increased hematuria. This seems to obtain. We may classify then the three cardinal subjective symptoms as: (1) Urinary disturbances, anuria, and pollakiuria. (2) Hematuria. (3) Pain. Two or all of these may be present, two absent, one must be present. In our series pain was found to be complained of most frequently, then the frequency of urination, and lastly hematuria.

Bovée calls attention to a peculiar gait that indicates a desire to keep the psoas muscle relaxed. Meltzer's sign of pain on hyperextension of the thigh is based on the above principle. The stamping test of Lucas may be of value in doubtful cases. The percussion test of Lloyd,[24] which produces pain by giving a sharp blow over the region of the kidney, is of questionable mention here. Dittel's crises should also be borne in mind as a significant diagnostic measure.

Lloyd[24] calls attention also that exercise increases the pain of renal stone but does not increase the pain of ureteral stone.

Stone in the ureter can be palpated per rectum, vagina,

or through the abdominal wall only when of enormous size (Bovée's case) or is favorably located. Nor can we determine the site of the stone even if pressure be made directly over it. The pain elicited may be referred to the kidney, to the bladder, or to the thigh. Obviously palpation for these small incrustations is of negative value. By (1) urinalysis, (2) cystoscopy, (3) ureteral catheterization, and (4) the *x*-rays we possess the most reliable measures, one or all of which may lead us definitely to localize or determine the presence of stone.

1. *Urinalysis.* Necessarily the character of the urine will be dependent on the degree of obstruction, whether complete or incomplete, upon its being unilateral or bilateral, and upon the health or diseased state of the kidney above. Lloyd[24] states that when the ureter is only partially blocked the urine secreted is of low specific gravity, poor in urea, and does not contain albumin; the constant presence of pus is highly significant; this has already been referred to.

In Case I there was at operation an apparent complete obstruction. The urine was negative to stone findings.

It is with great difficulty that the epithelial lining of the upper urinary track can be segregated microscopically, for the epithelium from the pelvis of the kidney and that of the ureter are histologically identical, the difference in their size only determines their former location. It may be roughly stated that there is a progressive increase in size in the epithelium from the convoluted tubules above to the bladder below, that of the ureter being double the former and one-half the size of the latter.

The constant presence of the larger numbers of the epithelium allows us to venture a definite idea of their former position. The appearance of crystals cannot be considered so significant; they are necessarily transitory and claim no great diagnostic feature. Frequent and numerous examinations must be made, for it is evident that the urine leaking by a stone which has caused a transitory hydronephrosis

carries with it cellular elements which did not present when the urinalysis was represented by the healthy side. Again, the plugging may have occurred in the ureter of the working kidney, a diseased organ of the opposite side giving off its products for examination.

It is to catch the stone unawares in all phases and times of its journey and influences upon the kidney and ureter that the importance of repeated urinalyses is so emphatically brought out.

The constant presence of microscopic blood, pus cells, and epithelia of their varying constancy, now one to the front and now another, but all being found on repeated examinations, would, at least, in the absence of other clinical signs, give a clue to the possible cause of the patient's distress.

2. *Cystoscopy.* By this procedure stone in the bladder may be immediately eliminated or confirmed as the source of the trouble. A stone caught in the ureteral mouth is plainly seen, and may be wormed into the bladder by one of the many operating cystoscopes. The writer would take this opportunity to call attention to the appearance of the ureteral outlet into the bladder in conditions of ureteral stone. In our series of cases, where the stone lay below or at the brim of the pelvis, in each instance there was a distinct pathological appearance of the ureteral mouth, produced by the pressure of the stone above upon the venous and arterial radicles, causing an edema, puffiness, and stasis, which was decisively apparent by contrasting with its fellow of the opposite side. The ureteral mouth seemed more open, larger, the dimple elevated and pouting, crater-like, the periphery blanched and fluffy. In a case recently operated upon for stone in the kidney, this same condition obtained at the ureteral mouth. The writer believes this is unusual, however. The appearance of the mouth in ureteral block must not be confounded with that of a ureteritis, or one initiated by a pyelitis or pus kidney above, for in this latter the os is red and turgid, the small radiating vessels are

swollen and congested, and the fissure seems more slit-like and not everted or crater-like.

Again, by cystoscopy, blood, pus, debris, and mucous shreds may be seen emitting now and then. The significance of this feature is evident. With the instrument *in situ* we are now prepared to carry out:

3. *Ureteral Catheterization.* The writer has had no experience with wax-tipped bougies. They would seem to be of value in certain cases; with the customary ureteral catheter, 7 or 8 F., the mouth is readily entered. There is no pain or discomfort experienced until the stone is struck, dislodging it, bruises the mucosa, and the pain, intense and sharp (in our series), was constantly referred to the kidney. Were a stylet to be used the catheter might easily be shoved through the ureteral wall at that weakened dilatation, distal to the point of the stone's arrest; this method, therefore, should be condemned. If the stone lies, as a ball valve, the catheter may readily get by it, gaining the kidney, thus deceiving the operator. If firmly arrested (incarcerated) the catheter cannot get by; the resistance offered is evident, for the catheter straightens out the ureter and now doubles in the bladder. If this occurs the catheter should be removed and the operation done over again, to assure one's self of no faulty technique. The olivary tipped catheter would more likely find its way through a stricture of the ureter. If stricture is the cause of arrest, the pain brought out by attempted sounding is of a different character from that caused by dislodging a stone. It is not so severe or immediate, the resistance offered the catheter does not appear so abrupt.

It is while the catheter is being retained that the phenol-sulphonephthalein test may be employed to determine the functional activity of the kidneys and their ability to stand operation.

4. By the *x*-rays we possess the most reliable means of diagnosis for ureteral calculi, the peculiar value of this method is positive as well as negative.

Aside of recording the number, size, shape, and location of the stone on the affected side, the unsuspected kidney and ureter are likewise shown up, for stones are not infrequently bilateral.

The reliability of the *x*-ray in the hands of the skilled operator cannot be gainsaid. When this method does fail (which must occur in a certain percentage of cases) it may be traced more to physical laws than to a negative value of this measure.

Stone weight determines the shadow. The most distinct is that of the oxalate of lime; this shadow is deeper than bone tissue. Phosphate of lime calculi are next in depth of shadow, and pure uric acid crystals which constitute a fair percentage of all cases, throw a very slight or no shadow at all. It is with this type of stone that the error in interpretation has largely arisen. In our series, the *x*-ray was negative in two instances (Cases VIII and II). This was a fibrinous cast of the diverticulum which, having no nucleus, could throw no shadow. The technique was the same; physical laws were such that the impossible could not happen.

According to Leonard[23] the Röntgen method includes less than 3 per cent. of error, this representing indeed the discovered error.

The skilled operator will not confound the shadow obtained with appendoliths, enteroliths, calcified glands, phleboliths, calcareous deposits in the iliac artery, sesamoid bone in the tendon of the obturator internus, bony spurs, etc. For, if in doubt, another *x*-ray with the ureteral stylet or leaded catheter may be employed to determine the accurate location of the suspected stone. When stone is suspected in the pelvic portion of the ureter, the patient should be skiagraphed in a sitting posture; this does away with the bony background of the sacrum—a frequent source for misinterpretation. Dodd, of Boston, and Gray, of Richmond, have called attention to this.

"The Röntgen rays have given many unexpected revelations" (Rovsing[32]).

Although a diagnosis of ureteral stone might be pretty accurately brought out by urinalysis, cystoscopy, and ureteral catheterization, aside from the clinical symptoms, a method which offers such positive claims and results, so economical, mechanical, and determining in its value as the *x*-ray, cannot be given a minor place or undue consideration in those cases of even suspected stone. In negative findings, exploratory operation is not precluded. In positive findings it determines us how and where to operate.

Differential Diagnosis. The clinical symptoms of ureteral stone are essentially those of a long standing chronic discomfort, with ultra-acute exacerbations, the pain is agonizing and distinctly urogenital, and characterized by urinary disturbances, anuria, pollakiuria or hematuria.

But few intra-abdominal surgical conditions arise so abruptly from a clear sky. Gallstone colic should be eliminated, bile pigment in the urine in the absence of blood and pus would be significant and leading. Appendicitis could be justifiably confounded with impacted stone in the ureter.

	Ureteral stone.	Appendicitis.
Age	Constantly in second and third decades	Any age.
Sex	More frequent in males	More frequent in males.
Occupation	Sedentary	No influence.
Pain		
Onset	Ultra-acute, reaches climax in five minutes	Subacute, reaches climax in twenty-four hours.
Location	Urogenital: kidney, bladder	Abdominal, epigastric, focal.
Duration	Two to four hours, rarely longer	Twelve to twenty-four hours probably longer.
Temperature	Normal, subnormal.	Normal, elevated.
Pulse	Much accelerated, soon drops	Moderately acceler., more so.
Urinary disturbance	Anuria, hematuria, pollakiuria	None.
Vomiting	Of shock	Splanchnic disturbances.
Belly wall, right rectus	May be rigid if on right side	Rigid.
Right thigh	Flexed	Flexed.
Bowels: stone in pelvic part	Tenesmus, constipation	Constipation.
Palpation over appendix	Not painful	Painful.
Urinalysis	Blood, pus, crystals	Nothing significant.
Blood count	Normal	Elevated.
Termination	Gets rapidly better	Grows slowly better or worse.

TREATMENT. The size, number, and location of the stone having been accurately determined, the treatment resolves into one of two methods:

1. Ureteral catheterization and lavage.
2. Operation.

It would seem advisable in small stones and those located in the lower segment of the ureter to attempt by ureteral catheterization and injection to dislodge them. This will likely occur in a fair percentage of instances. (Cases II, III, V, and VII.)

If this method fails operation is indicated.

The writer has done only the extraperitoneal. It does not appear that the intraperitoneal or combined methods offer any peculiar advantage which would justify the possibility of peritoneal infection or urine leaking from a suppurating track. An incision starting midway between the highest point of the crest of the ilium and the eleventh rib and running to the anterior superior spine of the ilium, thence parallel with and internal to Poupart's ligament for its outer three-fourths, has in our series given sufficient opening to explore the ureter from the kidney above to the bladder below.

In those instances in which the stone is incarcerated in the intravesical segment, the incision may be carried down to the spine of the pubes, this gives all the room desired.

The ureter is cut through its long axis, the stone removed. Catgut sutures approximate the wound, and a tube is inserted to the site. In our series there was leakage in but one case for five days, the remainder giving none at the end of two days.

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THE EARLY DIAGNOSIS AND TREATMENT OF RENAL TUBERCULOSIS

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From a review of the observations of Schede,[1] Morris,[2] Kelly,[3] Kapsammer,[4] Ransohoff,[5] Hunner,[6] Keyes,[7] Noble and Anspach,[8] and others, we may accept as established facts that renal tuberculosis, aside from its presence in association with acute miliary tuberculosis, is, in the beginning, a unilateral infection; that it remains so for a period extending over many months; that it is practically always hematogenous in origin; that the primary focus may be so small, so deep seated, or so encapsulated as to entirely escape detection; that in the vast majority of cases the infection of the ureters and bladder is a descending infection; and that primary infection of the bladder is extremely rare.

For the most successful results in treating this condition the case should reach the surgeon while the lesion is unilateral and before the process has extensively involved the ureter and bladder of the affected side.

The great difficulty has been that the patients have, in the past, rarely reached the surgeon until the infection had been present for months or years.

This is due to the fact that in a large percentage of cases no symptoms referable to the kidney are present until late in the disease, and that much valuable time is often lost in treating the irritable bladder without any idea of the seriousness of the underlying cause of the irritability. Thus Noble[9] says of ten nephrectomies for renal tuberculosis, "In but

a minority of the cases were the patients refered to me with a diagnosis of disease of the kidney; in the majority of cases the diagnosis was cystitis." Kelly says that in his series of 62 cases, reported before this society at the Baltimore meeting in 1906, the average duration of symptoms when the patients came into his hands was three and one-half years, in one case thirteen years.[3] Johnson reported a series of 9 cases in which the duration of symptoms was three and one-half years, and in 8 of these the symptoms were referred principally to the bladder.[10] Hunner found the average duration of symptoms in his series of 35 cases to be four and one-half years, and in half the cases the symptoms were vesical.[6]

The foregoing collection comprises 116 cases, and they have been taken at random from a number of reports from which they differ in no material matter. The fact that the average duration of symptoms before diagnosis was reached was more than three and one-half years, and that very few came to the surgeon with diagnosis of kidney disease, convinces one that the profession generally is not sufficiently familiar with the early symptoms of renal tuberculosis; especially that they are not sufficiently aware of the seriousness and significance of prolonged and intractable cystitis and vesical irritability, and that the technical difficulties in the way of arriving at a correct diagnosis are considerable.

In making a diagnosis early in the disease, one must have in mind those early obscure symptoms which are suggestive of renal tuberculosis, and, his suspicions having been aroused, he must bring to bear on the case the most careful, painstaking methods of investigation to confirm or dispel his suspicions.

Symptoms. As Hunner[6] points out, and as the patient whose history I will present demonstrates, the general condition of the patient may be extremely good, even in the presence of extensive renal disease, so let no one be deceived by this appearance of apparent well being.

The first symptoms are usually vesical. There is frequency of urination, with some pain and tenesmus. The urine may be normal, or a slight polyuria may be present. The urine remains acid, unless mixed infection occurs, becomes cloudy from the presence of pus, may contain blood in microscopic quantities, or there may be marked hematuria. The urgency of the urinary symptoms and the absence of marked abnormality of the urine should always put one on his guard. The symptoms may remain confined to the bladder for months or years, Schede[1] mentioning a case where they were present for eight years, complete relief following the discovery and removal of a tuberculous kidney.

Later on, the quantity of urine increases, the specific gravity becomes low, and albumin may appear. Sometimes with the early symptoms may be present slight renal tenderness and undue mobility, as Hunner found in two of his cases.[6]

In a small number of cases hematuria may be the earliest symptom, and in others renal colic may early appear.

The temperature is usually slightly elevated in the afternoon, and in other cases there may be no rise or the temperature may be subnormal.

Ransohoff[5] says: "Every cystitis which is not gonorrheal, the result of instrumentation, trauma, or stone, must be looked upon with suspicion, especially in the young."

Following these early symptoms, the presence and persistence of which should always arouse our suspicions, the patient may suffer pain in the loin with tenderness over the corresponding kidney, and a tumor may gradually develop. These give evidence of the location of the disease, while loss of flesh, failure of appetite, the presence of sweats, and the development of cachexia attest the seriousness of the general condition.

In certain instances the kidney may be painlessly destroyed, and the compensatory hypertrophy of its fellow, with pain and tenderness, may lead one to the erroneous conclusion

that the sound kidney is the diseased organ. Nowhere is it more necessary to establish the condition of both kidneys than in renal tuberculosis, for the above-mentioned mistake has been made with removal of the healthy organ and the death of the patient from anuria.[10]

In advanced cases rigors, sweats, and colic may occur. The urine may at times clear up on account of the obstruction of the ureter of the diseased side by pus, blood clots, or detritus from the broken-down kidney.

Diagnosis. When the possibility of renal tuberculosis has been suggested by the presence of any of these symptoms, special diagnostic methods must be brought into use. These consist of complete chemical, microscopic, and bacteriological examinations of the urine, together with the use of the cystoscope and the ureter catheter.

Repeated examinations of the centrifuged urine should be made for the detection of tubercle bacilli, and, if necessary, the inoculation of guinea-pigs should be resorted to.

An acid purulent urine which gives no growth on ordinary culture media is always suggestive of tuberculosis.

The cystoscope will reveal the condition of the bladder, and observation of the ureter mouths will usually show which is the affected side.

The use of the ureter catheters fulfils a double purpose—that of securing the separated urines for examination for tubercle bacilli, and of securing the separated specimens for the application of functional tests.

As the treatment usually looks to the removal of the affected kidney, this latter is most important and should never be omitted.

In doubtful cases the tuberculin test may be of help in a general way.

Treatment. Early diagnosis and prompt nephrectomy are the necessary measures for treatment. Following these measures may be applied all the hygienic and special therapeutic measures possible for the upbuilding of the patient

and the final eradication of the disease—but they should not be depended on before operation.

Kelly[3] had not seen, in 1906, a spontaneous, natural, or medical cure where the tuberculosis had been clearly demonstrated, nor had any of the kidneys which he removed by nephrectomy shown any kind of a healing process which preserved the functional capacity in the affected part of the kidney.

Albarran[11] claims that "there is not a single anatomical specimen showing spontaneous healing."

The use of tuberculin has brought about some symptomatic cures, but Fenwick[11] says: "Eighteen years' experience with tuberculin proves to me that it rarely cures urinary tubercle."

In the presence of extensive disease of one kidney and slight involvement of the other, nephrectomy gives good results. Kreissl[12] lays down the rule in regard to this point that we must have "positive proof of a second kidney which is organically healthy, or nearly so, and functionally intact, or promises to become so after removal of its diseased mate."

Partial resection is unsafe in that one may never be sure that a tuberculous focus has not been left behind.

Nephrotomy is unsatisfactory, and is to be resorted to only in the presence of urgent symptoms, and should then be followed by nephrectomy as soon as possible.

The ureter, when extensively diseased, should be removed either at the time of operation or secondarily, though Kelly[13] remarks that "ureterectomy is less frequently done now than ten years ago." If its entire removal is not attempted, as much as can be well removed should be excised and the mucous membrane of the remainder destroyed. This may be done by the injection of carbolic acid. In many cases, following the removal of the kidney, spontaneous healing of the ureter will occur.

It must be remembered that the patient who has a tuberculous kidney may have a tuberculous deposit elsewhere

in the body, so surgical treatment should be followed up by all that hygiene, fresh air, diet, and tonic treatment can do toward the final eradication of the disease, and tuberculin should be given a careful trial.

The patient whose case I will present proved exceedingly interesting in that she was in splendid general condition, and that she never had any symptoms, either subjective or objective, referable to the kidney.

S. D., white, female, aged eleven years, was brought to me on June 3, 1910, suffering with severe vesical tenesmus. Immediate family history was good, but there was much tuberculosis among the members of the family of her mother. She had had the usual diseases of childhood, none of which had given her any special trouble.

In April, 1909, her mother observed on one occasion some bloody-looking urine. In June, 1909, frequency of urination was noticed, but as it was without any special pain not much attention was paid to it. A little later, her mother saw a considerable white sediment in the urine, probably due to the presence of pus. Later in the summer she received some treatment and improved. In March, 1910, she became much worse, and the vesical irritability became so bad that she had to empty the bladder every ten to fifteen minutes. It became necessary to confine her to bed for several weeks. At this time I learn from the physician who had her in charge that the urine was acid, contained some blood, a good deal of pus, and that the specific gravity was 1018. During May she was able to be out of bed, but the irritability of the bladder was not much improved.

At the time of my examination I found a plump, rosy-cheeked girl, with normal temperature, a pulse of 84, normal heart and lungs, abdomen negative, and no pain of any sort except that due to the almost constant desire to urinate.

The measured urine for twenty-four hours showed 32 ounces, and, in addition, a good deal was voided involuntarily at night and could not be measured.

Examination of the urine showed acid reaction; specific gravity, 1012 to 1018; much pus, a few red cells, no albumin, and no casts.

A catheterized specimen was negative on culture media, and staining with methylene blue did not reveal any organisms.

The bladder was sounded for the presence of stone, but with negative result. *X*-ray pictures were made of both kidney and ureteral regions without revealing any stone shadows. Repeated examination was made over the abdomen without eliciting any tenderness of either kidney.

Another specimen of urine was secured and examined for tubercle bacilli, and a number were found.

Further extensive physical examination was made for signs of any tenderness, pain, or tumor to indicate the location of the disease, but with absolutely no result.

On June 27 she was removed to St. Vincent's Hospital for cystoscopic examination. On account of her age, I feared I would not be able to dilate the urethra sufficiently to admit my cystoscope, so secured an instrument used by rhinologists, the salpingoscope, which I had seen recommended for use in the bladder of children, and found that it worked excellently in giving one a view of the interior of the bladder, and I commend it to those who may have such cases in children too small to be subjected to the introduction of the ordinary cystoscope. I found, however, that I could use my catheterizing cystoscope with very little difficulty.

The bladder mucosa appeared healthy except around the left ureteral orifice. This was red and edematous and slightly ulcerated. The right orifice appeared entirely normal.

The catheter was passed into the right ureter without difficulty. It was passed into the left ureter, but would advance only a short distance. Urine flowed freely from the right kidney, but none was secured from the left. Indigo-carmine was injected as a functional test, and the urine from

Photograph of kidney removed from patient.

the right kidney became colored within twenty minutes, while none was obtained from the left side. The left catheter was withdrawn, the bladder washed out, and a rubber catheter was placed in the bladder to collect the urine indirectly from the left kidney. After watching this urine for more than an hour, only the faintest possible bluish discoloration was detected. This test showed very well the healthy functioning condition of the right kidney and the very poor condition of the left kidney. Tubercle bacilli were found in the urine collected indirectly from the left side, but none could be detected in that from the right.

A few days later, in order to eliminate any possible bladder contamination, the left ureter was again catheterized and this time the catheter was advanced without obstruction. About one dram of pus was secured. This pus contained numerous tubercle bacilli.

These examinations located the seat of the disease in the left kidney, and showed that the right kidney was apparently healthy and functionating normally. The removal of the left kidney was advised. Guinea-pigs were inoculated with the urine from each kidney.

On July 18 the left kidney and about two inches of the ureter were removed, and multiple tuberculous abscesses were found. The ureter was injected with carbolic acid.

Following the operation the patient reacted promptly; there was no interference with the urinary excretion, and the patient left the hospital at the end of three weeks, much improved in every way.

She was later taken to Colorado, for the benefit of the climate, and had gained 19 pounds in two months.

Occasionally the bladder becomes irritable, but she is making steady improvement.

Never up to the time of operation could we elicit any pain or tenderness referable to the diseased kidney, nor with the exception of two or three days following the operation did she ever have any fever.

The guinea-pigs were killed some six weeks after the inoculation, and both showed tuberculosis. From the condition of the urine from the right kidney before operation and the voided specimens after operation, the lesion in the right kidney must have been exceedingly small, if indeed, there was any deposit at all in this kidney, it being a well established fact that tubercle bacilli may be eliminated in the urine from a healthy kidney if there is a focus elsewhere in the body.

SUMMARY. Renal tuberculosis is, in the beginning, a unilateral infection, and may remain so for a long time.

For successful treatment, the patient should reach the surgeon while the disease is still confined to one kidney.

The early symptoms are rarely referred to the kidney, but in a large percentage of cases are vesical, and may remain so for many months.

For the diagnosis, repeated examination should be made for the detection of tubercle bacilli in the urine, and often the inoculation of guinea-pigs should be resorted to.

The cystoscope and ureter catheters must be made use of to ascertain the condition of the bladder, and to determine which kidney is the seat of disease, also for the purpose of ascertaining the organic and functional condition of the second kidney.

The treatment consists of prompt nephrectomy followed by the best hygienic, climatic, and dietetic management.

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DISCUSSION OF THE PAPERS OF DRS. BRYAN AND MASON

Dr. Ernst Jonas, of St. Louis.—I have been especially interested in the first paper. Two years ago I read a paper entitled "The Advantages of the Combined Intra- and Extraperitoneal Operation for Stone in the Lower Ureter." At that time I pointed out that the view that almost all cases of ureteral stones were secondary to stones in the kidney must be given up; and the recent experience of the *x*-rayist shows that there are a great many more primary stone formations in the ureter than was formerly believed. If then stones are primarily formed in the ureter, then we must look for special causes. That there are three distinct locations in which the ureter stones are mostly found is certainly not sufficient to explain the origin of stones in the ureter, but must induce us to further investigation.

Dr. Bryan has said that he did not see the advantage of the intraperitoneal operation over the extraperitoneal operation, but he points out among the causes for ureteral stones an inflammatory exudate in this region. I pointed out in the above-mentioned paper that, in men, an inflammatory condition of the appendix, in women, a like condition or adhesions around tubes and ovaries or in connection with retroflexion of the uterus, might cause ureteritis or peri-ureteritis or produce a kink in the ureter, or at least increase the normal bend of the ureter at this point. On the left side sigmoiditis and diverticulitis of the

sigmoid may create like changes in the ureter. If we consider that the stone is caused by one of these things, what good will the removal of the stone do? It won't do much more good than a hypodermic injection of morphine, and unless the patient is relieved of this original cause, it will produce sooner or later another stone. We should emphasize the removal of the causes of these ureter stones, and since the intraperitoneal operation might reveal these causes and at the same time permit of their removal, why, then, not combine the intraperitoneal with the extraperitoneal method? It is extremely simple, after the abdomen is opened along the margin of the rectus, to remove the diseased appendix, to remove the diseased tube and ovary, and to look for stone in the ureter. You use this step of the operation for the location of the stone, then you push off the peritoneum laterally, and continue the operation extraperitoneally. To summarize again: The intraperitoneal part of the operation serves for exploration and for removal of conditions which are possible etiological factors in the lodging and formation of stones. It also frequently makes the finding of the stone easier. The extraperitoneal steps serve for the removal of the stone.

Dr. J. Garland Sherrill, of Louisville.—I wish to put on record one case of stone in the ureter which may be of some interest to the members of the Association. Through the courtesy of a professional friend, some years ago, I had the pleasure of operating upon a case of hydronephrosis, in which there were eight stones in the lower end of the ureter, the lower stone being olive-shaped and almost, but not quite, entirely plugging the ureter. The ureter in that case was very much dilated. The case was one of sixteen years' duration. Altogether it was a very interesting case. I simply report the case because of the number of stones presenting.

Dr. Bryan, I think, in his paper stated that in cases of complete occlusion hydronephrosis might result. My experience in the reading I have done upon the subject leads me to believe that hydronephrosis rarely, if ever, results in complete obstruction of the ureter. In the case where one ureter has been ligated, atrophy occurs.

A point in the treatment of renal tuberculosis of great interest is this, that the treatment of cases in which there is disease on both sides is important. In my experience I have seen disease on both sides when the patient presented for examination three times. In one of these I considered the damage on one side only partial; that is, only slight; in the other two I considered that the cases were not suitable for operation, and I did not subject these patients to operation. In one case I have mentioned the disease was very much advanced on one side; on the other side there was only a slight lesion. The subsequent his-

tory of the patient led me to believe that an operation for the removal of the worst kidney benefited the kidney which was partially diseased, and Mr. Henry Morris records a case where one kidney was removed for tuberculosis, and subsequently a portion of the other kidney was resected, and the patient recovered, which to me was very interesting. My experience is that nephrotomy is not of advantage in these cases; that they go on without permanent recovery, and the kidney tissue is destroyed. The operation of nephrotomy, or partial nephrectomy, is not to be recommended as a general rule.

Dr. Guy Le Roy Hunner, of Baltimore.—I have been greatly interested in both of these papers. In regard to the question brought up by Dr. Jonas regarding Dr. Bryan's paper, I should like to say, I believe we can find stones easier by the extraperitoneal route than by the intraperitoneal. That has been my experience, at least. Moreover, if we have a stone blocking the ureter and an infected pyonephrotic kidney, it seems to me risky to tackle the case from within the cavity. We can operate extraperitoneally and get the stone out, dilate the stricture below the stone, and sew up the ureter. If you wish to explore the cavity for appendix or possible sigmoid disease, you simply cut through the peritoneum and explore it, after the dirty work of removing the infected stone and allowing the urine to run over the tissues has been done extraperitoneally.

I was greatly interested in Dr. Mason's case. I believe he said his patient was eleven years of age. This is younger than any tuberculous kidney patient I have had. I have had three patients under twenty years of age, but this one of eleven years is rather unusual.

He spoke of the technical difficulties in making the diagnosis. It has always appealed to me that these difficulties are more imaginary than real, and the reason early diagnosis is not made is because physicians are lazy. They do not examine the urine. He has brought out the differential points that we need; with bladder symptoms, pus in the urine, and cystoscopy showing the mucosa of the bladder to be normal, the probabilities are that we are dealing with a tuberculous kidney. Sometimes in these cases there is a stone in the kidney, but if there is pus there and stones you will get a culture. If it is tuberculosis, the chances are you will get no culture. Some cases of tuberculosis do have the colon bacillus or gonococci as a concomitant infection. It is more a question of indifference than inability to make a diagnosis in these cases. In a case of localized tubercular infection the urine should be examined systematically every few days, and if this is done, it will yield tubercle bacilli, and the injection of guinea-pigs, of course, will be a great help in some cases where it is difficult to find tubercle bacilli.

That brings up another point I would like to make; I think I have spoken of it before in this Association, and that is, that the finding of pus on the other side and even the finding of tubercle bacilli, does not necessarily mean that the other kidney is tuberculous. We must not give up the case as amenable to medical treatment only if we find early evidences of involvement on the other side.

There is only one criticism I would make with reference to Dr. Mason's case and the conduct of it, namely, the fact that he catheterized a supposedly healthy kidney in this small child, where the difficulties of catheterization, without causing trauma, are greater than catheterizing in the case of an adult. We have not had many reports of infection being caused in this way, but I do not see why it is not possible. It is possible the guinea-pig inoculated from this side got infection from a clump of bacilli, caught in the eye of the catheter as it passed through the infected bladder. These, being carried up, would be washed out by the otherwise normal urine from that side. But to refer to this case, at first glance it would seem that both sides were infected. You will find if the disease has thickened one ureter, that is, manifestly the side that is badly diseased, and often you catheterize that side very easily, whereas on the other side you will be able to palpate through the vagina in the case of the female, and rectum in the case of the male, a slightly thickened ureter, and you may find some pus, and even in one of my cases I found tubercle bacilli, but after the removal of the bad side, the other side promptly cleared up. My explanation in these cases is that possibly the thickening going across the base of the bladder has caused the thickening about the ureteral orifice, and absorption of the infectious products up the lymphatics. This may be a temporary thickening, interfering with the valve-like action at the ureter opening, and when relaxed under sleep, the open mouth of the ureter allows the urine to back up into that ureter and kidney pelvis, and in that way we get a slight infection which will clear up after the removal of the bad kidney.

Dr. O. H. Elbrecht, of St. Louis.—I would like to discuss the last paper briefly, because I have had two cases which typify what the essayist has tried to bring out, one in a young woman, aged twenty-four years, whose condition started about six months ago with a cystitis, which was treated by one of our best genito-urinary specialists without any reference to the kidney. He tried the usual method, without making any special tests for tubercle bacilli, excepting microscopic examinations. When the woman came to me I asked who had been treating her, and soon found that there had been no test made for tubercle bacilli further than the ordinary microscopic analyses. I injected some guinea-pigs, had the ureters catheterized, which had been

attempted by the genito-urinary specialist, but he found it caused too much pain to permit of this, and so he gave up his attempt to catheterize, and it was this that led me to believe there was some tubercular process causing the severe degree of pain. I asked him to anesthetize her, which he did, and succeeded in passing a catheter, and while she was under the anesthetic I manipulated the kidney on that side. The reason for doing this was that only at times did the urine show pus, and then not in any great quantity. It was a case of badly tuberculous kidney, and the tubercle bacilli came down the ureters in showers.

The second case was one Dr. Bransford Lewis referred to me. He sent this man over to me, for the first time, two weeks ago, and I found that he had been treated for six or eight years off and on for supposed cystitis, no diagnosis having been made. Ureteral catheterization showed both kidneys were involved, but, as Dr. Hunner has said, one was just commencing. I asked Dr. Lewis if he had presented the prognosis to the patient, and he said, "Yes, I have." The man looked like a hopeless surgical risk, and he knew his chances for recovery were very slim. After he had been told his condition, he saw the only way out of it was to undergo an operation, which he said he was willing to risk. He did not weigh over 90 pounds. At the operation the right kidney was found in the pelvis on the ileum, and the man's right lobe of the liver touched across the ileum. The upper pole of the kidney was slightly to the anterior superior spine of the ileum. I called him up last night before I left for this meeting, and found that he had not the slightest reaction; that he seemed somewhat better and was more comfortable. His pain was relieved.

I cite these cases because the picture Dr. Hunner presents in his chapter in Dr. Kelly's book was made so plain by direct comparison, having both patients at the same time, one in a woman in perfect health, and the other in a man.

Dr. William B. Coley, of New York City.—I would like to say a word or two in regard to Dr. Bryan's paper, and also in favor of the position taken by Dr. Hunner with regard to the extraperitoneal method. I think the risks as compared with the intraperitoneal method mentioned by Dr. Jonas are no greater, if they are as great; and that the disease is due to trouble with the appendix or with the ovary is really hypothesis, and is not substantiated at the present time by sufficient clinical data and facts to call it a real cause. I might say in the majority of these cases surgeons are saved the trouble of making this exploration. In 4 cases Dr. Alexander Johnson presented of renal stone to the New York Surgical Society two weeks ago, the appendix had been previously removed in 3 of the 4, under

the mistaken diagnosis that it was the cause of the trouble rather than the stone in the kidney. In one of these cases the stone was in the left kidney. The appendix has altogether too many burdens put upon it. It has been said to be the cause of 70 per cent. of duodenal ulcers, and of an equal percentage of troubles with the gall-bladder and liver, and now we are about to impose on it the cause of stones in the kidney or the ureters.

Dr. Howard A. Kelly, of Baltimore.—I have listened to these two papers with a good deal of interest, but as the second one which was read comes nearest to me, I will take a shot at it.

I shall never forget my first case of renal tuberculosis away back in 1887. At that time I was writing about my work on the ureters, and Dr. Mann, of Buffalo, stated that this case sounded like one of those I discussed at our meeting in Washington. He brought a young lady, a Miss Remington, whom we examined together, and after testing the lumen of the ureters and finding them thickened, we found the patient had tuberculosis of the kidney. Dr. Mann felt the thickened ureters and has been feeling them ever since.

Patients come to me with pyuria which has been treated for years, and after putting my finger in the vagina I make the diagnosis very quickly, and when this is done it is no use treating the bladder, but rather the upper ureteral tracts.

Briefly and categorically I will give the results of my experience. The eye test is valuable, but a patient can have tuberculosis in other parts of the body. It is not much satisfaction in many instances unless you can say where the tuberculosis is located. Koch's tuberculin is of value, though the hypodermic test is of great value, in that you may localize the disease and bring down, in some cases, a shower of tubercle bacilli, which you have not been able so far to find in the urine. The inoculation of guinea-pigs is of the utmost value, and I find it better to inject under the skin, and then you can feel the glands as they enlarge rather than the intraperitoneal cavity; you just inject under the skin near the thigh; the enlarged glands can be traced, and you can use that guinea-pig on some future occasion in case the glands do not enlarge. In every bladder case that comes to me I always crush the kidney. That is not done often enough. When a patient comes to me with vesical symptoms, I ask myself: Is the kidney at fault? In a great many cases we find the pyuria alone or often tubercular disease. There may be pyuria where you cannot demonstrate organisms, and I agree with Dr. Hunner that it is quite sure to be a tuberculosis of the upper urinary tract. I have only seen two or three cases of primary tuberculosis of the bladder in a large experience. If you get tubercle bacilli in the urine, almost invariably the kidney is at fault. But be exceedingly careful,

for some of the best men in this country have made a diagnosis of tuberculosis of the kidney, for the reason that the bacilli found turned out to be smegma bacilli instead of tubercle bacilli. One of our best diagnosticians at the Hopkins has made that mistake. He found that they were smegma bacilli instead of tubercle bacilli, and they were in the bladder. f you get tubercle bacilli from above the bladder you are safe. You must know the condition of the other side. I have, after finding pus and a thickened ureter on the other side, taken out the tubercular kidney, and the other side has cleared up. I did not get any tubercle bacilli from the other side, but it was a colon bacillus infection. By catheterizing the bad side you will invariably get tubercle bacilli. Run in the catheter, put a sound into the bladder, catch the urine as it trickles from the ureter from the good side, and that is reliable. If clear urine comes down, that side must be healthy. I do not know of any case that has recovered without operation, and Albarran has gone over this phase of the subject very carefully. I saw him this summer, and I regret to say that he is in the last stages of tuberculosis. He is a splendid, noble fellow! I do not suppose there is any one man who has done so much for this class of cases and diseases as he.

When we talk about a cure, of course, people may get tuberculosis and not be operated on, and be healthy in appearance afterward, but that is not a real cure, but a symptomatic cure. They get well in those cases with caseation. They have tuberculous kidneys which may never have been touched, and they have survived it.

There are one or two other important matters I would like to speak of. One is this: I think we are coming to do partial operations. In some cases I have taken out a small focus of tuberculosis, and I have sacrificed the entire kidney, but if I could find that the tuberculous process were limited to the upper part of the kidney I would resect the kidney and save the rest of it.

Let me refer to one other very important group of cases. You will occasionally find a double kidney on one side, or double kidneys on both sides, where one kidney will be affected and the other will not. In these cases look for the fibrous line of demarcation below the kidney and the rest of the kidney, so you may see two ureters, take out the tuberculous kidney and leave the other. I have come across a group of cases of double kidneys, one of which is tuberculous, and it is here that we can resort to conservatism with splendid results.

Dr. Henry T. Byford, of Chicago.—I discovered the ureters by vaginal palpation about 1885, and, like Dr. Mann, I have been feeling them ever since. I have discovered one thickened

ureter very frequently, particularly in old gonorrheal cases, and I have had the patients under observation for years, and I am quite sure that nine-tenths of them were not connected with tuberculosis. Infection of the Fallopian tube with subperitoneal exudate may cause rigidity and increase the palpability of the ureter under it and then be absorbed and leave very little evidence behind.

Dr. Kelly.—I did not mean all thickened ureters; I meant large, dense, hard, generally more or less irregular, mammilliform ureters, and those are almost always tuberculous.

Dr. Mason (closing).—At the time of my examination the question of catheterizing the apparently sound side arose. As it was extremely important to determine the condition of the right kidney, we decided to introduce the catheter, for the bladder ulceration was very slight, and we tried to irrigate sufficiently to reduce the dangers to a minimum.

For use in children, I have found an instrument which allows of complete inspection of the bladder, but does not permit of catheterization or irrigation. I refer to the "salpingoscope," an instrument devised for the use of rhinologists. It is very like a Nitze cystoscope, and can be used in the bladder of almost any child. In my case, however, I was able to use my regular-sized cystoscope, and to complete my ureteral catheterization.

DIAGNOSIS OF ECTOPIC GESTATION: WHEN AND WHEN NOT TO OPERATE

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There is but one reason for the production of this paper. It is presented for the sole purpose of eliciting a thorough discussion of its subject. The views therein expressed are supported by a record of 63 cases observed by the writer.

Although the pathology of ectopic gestation has been thoroughly and carefully studied—the diagnosis is, as a rule, difficult and sometimes impossible because of the multiplicity of the pathological changes produced. The greatest difference exists between a *tubal abortion* and an extra-uterine pregnancy at or near term; or between a *tubal rupture* and a suppurating ectopic gestation-sac containing a broken down lithopedion or macerated fetus. They have only one feature in common—they are all classed as extra-uterine fetation.

An imperfect knowledge of the various and numerous changes that may occur in the different varieties of ectopic gestation is, undoubtedly, responsible for the divers opinions as to which may be the wisest plan of treatment in each case. The questions to be decided are: Is it best to operate in every case without delay? Can the operation be deferred until the patient's condition has improved? Is it advisable to transfer the patient to a more favorable environment? Is it possible for the patient to recover without an operation?

There are many surgeons, perhaps they are the great

majority, who advise surgical intervention, in every case of extra-uterine pregnancy as soon as possible after the diagnosis has been made.

There is a considerable minority, however, which maintains that great haste is rarely, very rarely, an absolute necessity in cases of ectopic gestation; that in most instances we have time to prepare the patient and ourselves for the operation; that many times the patient may be safely removed to a hospital; and that some of these unfortunate victims may recover perfectly without an operation. The operator thoroughly familiar with the pathology of the various forms of extra-uterine pregnancy and the clinical phases produced by them, will rarely be misled in his judgment as to the time and mode of operative intervention.

It is, therefore, not alone the *diagnosis* of ectopic gestation which determines the mode of treatment; we must, to a certain extent, at least, know the pathological changes that have occurred in each case. We must be able to ascertain, as nearly as possible, the duration of pregnancy, the locality of the misplaced ovum, and the changes produced in the maternal structures involved.

A *tubal abortion* may take place and be followed by recovery without the least suspicion of the existence of an ectopic gestation. A physician may not even have been consulted in the case.

Almost invariably, tubal abortion occurs within the first two months of gestation. The *tubal pains* are, more or less, distinct and never very severe. But when blood and ovum come in contact with the peritoneum the pain is acute and the shock more or less marked. Symptoms of profound internal hemorrhage are absent. An examination usually reveals a small doughy tumor to one side of or behind the uterus. The pains recur at varying intervals, become gradually less pronounced, and finally cease altogether. The swelling in the pelvis, at the same time, becomes harder and smaller, and eventually disappears altogether. The blighted

ovum and blood discharged from the tube are slowly absorbed and no trace of them is left behind. There may or may not be a history of suspended regular, or irregular, menstruation. But the formation in the pelvis of a tumor associated with *tubal pains*, and a tumor which slowly disappears after the pains have ceased—may be safely regarded as a tubal abortion.

Unless the pains in a tubal abortion continue and the tumor grows steadily larger, as in the formation of a so-called *peritubal hematocele*, operative interference is hardly justifiable. Indeed, cases have been observed, time and again, in which even in peritubal hematocele complete absorption of blood and ovum took place.

The *peritubal hematocele*, first described by Sanger, represents an incomplete tubal abortion in which the tube has dropped into Douglas' pouch and its fimbriated extremity become strongly adherent to the floor of this cul-de-sac. But, in spite of the adhesions formed, the blood continues to exude slowly from between the bands of adhesions, collects and coagulates around the distended tube, forming a club-shaped tumor the size of a fist, immediately behind the uterus. If, after the formation of this tumor, the pains associated with it subside and entirely disappear and the swelling daily grows harder and diminishes in size, an operation is not an absolute necessity. Nature may, and often does, affect a cure in these cases. If, however, the tumor continues to increase in size, the pain is constant and anemia develops, the necessity of an operation is indicated and should be performed as soon as the patient can have the full benefit of asepsis at home or at a hospital. In such cases there is always ample time to prepare the patient for the operation.

In case of *tubal rupture* various totally different conditions may be noted. Most of them admit of waiting. In a few cases—very few—delay of half a day, perhaps of less time, may be fatal in its consequences.

Rupture of the tube between the layers of the broad ligament is, as a rule, preceded by tubal pains which increase in severity and frequency until the tube gives way. Hemorrhage results and both blood and ovum find lodgement between the folds of the ligament. Because of the limited space, bleeding is never excessive, though it may continue at intervals for some time, and form a hematoma of considerable size on one side and behind the uterus.

The clinical picture of this condition is not very striking. The patient may have experienced delayed menstruation, or missed a period or two, when she is seized with periodical pains, experiences possibly a slight loss of blood from the uterus, and a sense of weight and fulness in the pelvis. A digital examination reveals a doughy swelling to one side and behind the womb. Shock and acute anemia are hardly noticeable, or may be entirely absent. Here, as in simple tubal abortion and peritoneal hematocele, if the hemorrhage ceases and the patient is kept in bed, the pelvic hematoma becomes gradually harder and smaller and, in time, may be completely absorbed. If the bleeding continues, the pain will increase, the hematoma will grow larger, and anemia will soon manifest itself. This latter condition calls for early operative interference, but admits, usually, of ample time to prepare the patient for the operation.

Rupture of the tube upon its free surface, like rupture between the ligamental folds, is preceded by tubal pains. When the rupture takes place, severe pain with more or less, but very distinct, shock, always accompanies the accident. Shock and pain are due to the effect of the blood upon the peritoneum and both vary according to the amount of hemorrhage and the extent of the tear. Of course, the more extensive the rent the greater the hemorrhage, and, consequently, the more intense the pain the more profound the shock and the more marked the anemia.

If the loss of blood is moderate, as in the presence of a small rent in the tube, which is promptly plugged by the

chorionic villi and the exudation of lymph from the weeping peritoneum, hemorrhage is arrested, the patient rallies quickly, and, for the moment at least, appears to be out of danger. He who knows and does his duty will lose no time in operating as soon as he can secure for the patient that degree of safety so necessary for avoiding complications and for the recovery of the patient. Under these circumstances a day, or even more time, may be spent in preparation of the patient and her home. Especially so if it is evident that the blood in the peritoneal cavity reveals a tendency to coagulation and encapsulation. In cases of this kind the problem as to what should be done is easily solved.

This is not so, however, in those cases of tubal rupture in which the hemorrhage is profuse, the shock profound, and the anemia extreme from the start. When the physician is confronted with a case of this kind—the patient vomiting, pulseless, and colorless, the picture of violent shock and extreme exhaustion—within half an hour after the rupture has occurred—two contingencies arise: Is it wise to operate at once, without regard to asepsis of the patient and her environments, the surgeon, the dressings, and his instruments, hazarding as thorough sterilization as circumstances will permit before performing the operation? If he decides upon the latter course, an hour, two hours, and even more time may have to be spent before the patient is ready for the operation. Some one may say: "By this time the patient may be dying or dead." True, this may be so. But would the patient's life have been saved by an immediate operation? I have yet to see the first case in my own practice, or in the practice of others, where the patient did not die during or soon after the operation when the unfortunate woman was the victim of profound shock and exhaustion from excessive internal hemorrhage. In spite of hypodermoclysis and other means to support the weakened heart and enfeebled respiration, these unhappy patients succumb, and in every case which I have seen the operation has

more the appearance of a postmortem than an antemortem procedure. Not a drop of blood issues from the abdominal wound when the incision is made. And should, peradventure, the patient recover from the operation, what of the complications that are almost certain to arise in the absence of the precautions so important in abdominal surgery?

On the other hand, the writer has seen cases which were, apparently, brought to the verge of the grave from hemorrhage and shock due to a ruptured tubal gestation sac, in which, by the time the preparations for an aseptic abdominal section were completed, the patient had rallied from the shock, the pulse reappearing and respiration again becoming full and strong. The patient was thus placed in a far more favorable condition for the operation, with a much brighter prospect for a prompt, perfect, and permanent recovery.

Have not all of us seen the so-called *retro-uterine hematocele* of Nélaton? What a significant and impressive story of events it reveals in the chapter of ectopic gestation! Here we find the entire pelvic and lower abdominal cavity filled with coagulated and encapsulated blood, in the centre of which lies the blighted ovum, or the embryo, stripped of its membranes. The history of these cases invariably records a tale of days and even of weeks of suffering and confinement in bed, marked by repeated attacks of severe pain in the lower abdomen, often accompanied by vomiting and fainting spells, every renewed seizure of which means an additional tear in the ectopic ovisac, to be followed by hemorrhage and shock. The tumor which is thus formed extends sometimes up to and above the level of the umbilicus. Occasionally the true nature of the case is not recognized until the abdomen is opened.

No one who is familiar with the course and termination of a ruptured ectopic gestation cyst would stand idly by and expose the patient, needlessly, to repeated recurrences of pain, hemorrhage, and shock. But the retro-uterine

hematocele proves, beyond doubt, the persistent effort which nature makes to arrest hemorrhage, and that it is not wise to open the abdominal cavity in any case immediately after the diagnosis of internal hemorrhage from an extra-uterine fetation has been made, unless the patient's physical condition and surroundings are such as to give her the best possible chance of recovery.

The writer has never seen a case in which the patient died of hemorrhage within an hour, or even ten hours, after the first rupture had occurred. He is not disposed to deny that cases of death from internal hemorrhage may occur so soon. But these cases must be extremely rare, so rare, indeed, that most of us have never seen one. In the great majority of cases, the hemorrhage, which follows rupture of an ovisac, is moderate, and coagulation and encapsulation of the blood, as well as the formation of adhesions around the tear, are very prompt. Thus the hemorrhage is, temporarily at least, either entirely arrested, or it continues very slowly. At any rate, not enough blood is lost to prevent the patient's rallying from the shock of the initial tear and hemorrhage.

The best evidence of nature's remarkable effort to repair is seen in those cases of ruptured tubal pregnancy in which the ovum continues to live and develop for weeks and sometimes months. A new gestation sac is built up by degrees around the ovum by the formation of adhesions between the omentum, visceral and parietal peritoneum to such an extent that the pregnancy may continue even unto the end of term. We could not ask for a more striking and convincing illustration of what nature does for many of these cases, and we should heed the lesson.

The character of a ruptured ectopic gestation sac is, however, entirely different when coagulation and encapsulation of the blood is exceedingly slow or does not occur at all. Fortunately cases in which coagulation and encapsulation fail to take place are very rare. These are cases in which the symptoms which accompany and follow rupture

are very alarming from the beginning. Unless coagulation and encapsulation of the blood succeed in due time, the hemorrhage will prove fatal in a comparatively short time. But from twelve to twenty-four hours usually pass before death results from the loss of blood alone, so that even in these cases, bad as they are, there is ordinarily ample time for the operator to prepare his patient and himself for an aseptic abdominal section. Patients who have bled, more or less continuously, from four to twelve hours or longer, who have vomited excessively, whose features have become pale and pinched from suffering and from the loss of blood, who are without pulse, and who are in a state of utter hopelessness and despair, will not be saved from death even by a prompt and strictly aseptic abdominal section. What hope is there in the "*jack-knife and shoe-string procedure*" for the unhappy victim?

What has been said of tubal gestation with rupture of the tube into the free peritoneal cavity is, more or less, true of rupture of an interstitial ectopic pregnancy. But the symptoms are decidedly more violent from the beginning. Only an early aseptic operation can save the patient. But, even in these cases, coagulation and encapsulation of the blood frequently causes in the patient's condition a temporary improvement, which will allow sufficient time to erect all the safeguards for a successful operation.

Cases of tubal pregnancy in which the tube remains intact to the last, are very infrequent. Because of the absence of rupture and adhesions, symptoms are wanting. The existence of tubal pregnancy is not recognized until the fetus dies either prematurely or at the end of term, and labor is "missed." However, should this form of ectopic pregnancy be diagnosticated—no matter at what period of gestation—it is, invariably, a case for operation. No chance should be taken in permitting the case to go to the period of viability or to the end of pregnancy. These cases always admit of ample time for necessary operative precautions.

The same may be said of the *ovarian, tubo-ovarian, tubo-abdominal,* and *secondary abdominal* varieties of extra-uterine fetation. All are cases for operation, as soon as the diagnosis is established. But here, again, though there is every reason for avoiding procrastination, there is no need for undue haste, and a favorable time of the day and a convenient place for the operation may be selected.

It is not necessary to add that a safely encysted ectopic pregnancy should not be permitted to go on indefinitely, even though numerous cases are on record where a lithopedion, or lithocelphus, has been retained for years without causing serious inconvenience. In most instances suppuration sets in sooner or later, either through a direct infection or through a process of positive chemotaxis. The patient should not be exposed to the risks and annoyances attending a suppurating ectopic fetus and gestation sac.

Before closing, it may be well to answer a few questions which are often asked: "How can you tell when hemorrhage from a ruptured ectopic gestation has ceased?" "How do you know when the blood, spilled into the peritoneal cavity, coagulates and encapsulation of the same is taking place?" The answers are simple: If the patient recovers from the shock and her condition improves, the hemorrhage has stopped. If with the improvement in the patient's condition a doughy swelling can be felt to one side, behind or around the uterus, coagulation of the blood is going on and its encapsulation is the natural consequence. In the absence of renewed hemorrhage, the swelling in the pelvis slowly becomes harder and smaller because of the absorption of the watery element of the blood. If the blood does not coagulate and the bleeding continues, there is no swelling to be felt through the vagina; but, instead, the cul-de-sac is flattened and fluctuation is present. Palpation and percussion of the abdomen reveal all the symptoms of ascites. A flattened vaginal fornix, and the presence of fluctuation in connection with other physical signs of ascites, always

means that the blood in the peritoneal cavity is not undergoing coagulation, that the patient is still bleeding or is likely to bleed again at any moment.

Conclusions. 1. Tubal absorption is frequently not recognized and often terminates in recovery. If diagnosticated, a hurried operation is never necessary.

2. Tubal rupture between the broad ligament never places the patient's life in immediate jeopardy. There is plenty of time to prepare for an operation. Some cases recover without resort to the knife.

3. Tubal rupture into the peritoneal cavity, including the interstitial variety of ectopic gestation, is always a grave accident. The symptoms are, usually, marked and characteristic. The sooner the patient is subjected to an operation, the more prompt the recovery. As a rule, there is time sufficient to prepare for an aseptic operation.

4. All cases of extra-uterine fetation which result in subperitoneal hematoma, or peritubal hematocele, or retrouterine hematocele, should be brought to an early operation. Most of these cases may be safely conveyed to a hospital and carefully prepared for operation.

5. Cases of advanced, or long-retained, and well-encysted, extra-uterine pregnancies are nearly always easy of diagnosis, and should be operated upon as soon as the patient can be made ready for the event. These patients, too, may be with safety removed to a hospital.

6. It must be admitted that it is possible for a patient to bleed to death from a ruptured gestation sac within an hour or two. Nor can it be denied that this occurrence is extremely rare. So rare, indeed, that most of us have never witnessed a case of this kind.

7. If the history of every case of rapidly fatal hemorrhage from a ruptured ectopic gestation sac could be exactly recorded, it would be found that by far the great majority had been bleeding from twelve to twenty-four hours before an experienced operator was called.

8. A patient who bleeds to death within an hour or two could have been saved only by an operation performed within from fifteen to thirty minutes following the tear in the gestation-sac. And if the man with the "jack-knife and shoe-string" had been present when the accident occurred, would he not have hesitated a little before he proceeded with the operation? And whether he hesitated or not, his patient would surely be lost.

9. Patients who have bled for many hours, who are bloodless, colorless, pulseless, and completely exhausted, are not good subjects for an operation. They either die during the operation or soon thereafter. It is true the operator has done his duty. But where is his satisfaction?

10. It is proper, therefore, to weigh well the evidence in every instance. All depends upon the time when we first see the patient, her condition, her surroundings, and our own preparedness for an immediate operation.

DISCUSSION

Dr. J. G. Earnest, of Atlanta.—There is one point in this paper in regard to which I would say a word. That is as to whether we should operate immediately when the patient is seen soon after rupture of the sac. She is usually clammy and almost pulseless, and her general appearance is such as to require some courage on the part of the operator to give her an anesthetic lest she should die on the table. I believe her best chance is in immediate operation. Several experiences like this have led me to that opinion.

About a year ago I was going out of the Grady Hospital when the house surgeon called me, stating that a patient had just been brought in with ruptured tubal pregnancy. I found she had a pulse which was flickering, and could barely be detected. Her skin was cold and clammy, and it looked as though she would die in a few minutes unless saved by operation. We put her on the operating table, and in less than fifteen minutes had forceps on the bleeding artery, and at the same time salt solution was given under the skin. The patient made a good recovery.

The fact that a certain per cent. may recover does not justify the waiting. I had one such experience, but it has not changed

my mind. I was called to the country on one occasion, and found a ruptured tubal pregnancy. The woman was apparently almost moribund. I had not expected anything of the sort. I had no efficient help, and the circumstances were such as to make it out of the question to undertake an operation. It did not look as though the woman would live two hours. Eight months afterward she was brought to me in Atlanta, and I operated on her for an eight months' abdominal pregnancy. That case was reported to this body at the meeting in St. Louis. My experience has encouraged me to believe that it is advisable, even when the patient is *in extremis*, if circumstances are such as to admit of a rapid, clean operation, to give the woman the benefit of the doubt, for nine times out of ten unless you immediately stop the bleeding the patient will die. The case just referred to, I am sure, is exceptional, and would not be a safe precedent.

Dr. Rufus B. Hall, of Cincinnati.—This paper covers the ground so thoroughly, and the time is so limited for discussion, that there are only one or two points I will take up, and the one point that interests me as much as anything is that which pertains to the desperate cases like the one referred to by the last speaker (Dr. Earnest). He referred to those cases that go on and bleed until, when the operator is called, they are pulseless, but I refer to those cases that are even further advanced than the patient mentioned as having been operated on by the last speaker. I am convinced that every man must decide for himself, when the patient is before him, whether or not she has the best chance for her life whether to undergo immediate or a deferred operation. I believe, as the essayist does, that rarely will these patients succumb from the loss of blood from the first hemorrhage, for if they are pulseless or in that extreme condition of shock from the loss of blood, if you resort to immediate operation you add another weight or another chance for such patients not to recover. I think the two cases reported by Dr. Earnest only emphasize this very fact. He operated on his first patient when she was almost pulseless and in an extreme condition. She recovered, but that does not mean she would not have recovered if operation had been done a little later, when her condition was better. As to the second case, he operated on that, with the woman in the same desperate condition, but a little later, after she had recovered from the shock. If a woman with a pulse of 140 or 150 should be operated, that would be better than operating on a woman with no pulse. The latter, many of them, would have a better chance to wait until they do rally. Early in my career I felt a woman would die if we did not operate. On two or three occasions I operated, as I remember very distinctly, when the patients were in a

desperate condition; they were pulseless, with sighing respiration, one of whom lived about thirty minutes after she was put in bed. On the other hand, I can recall a dozen or more patients in the same condition, pulseless, and have waited for them to rally, or until they reacted in a measure, and I do not recall a single instance where one of these women lost her life by the delay. The principal point is that the physician must differentiate between the patients that should be operated upon at once and those that are to be operated on later. There is not much advantage to the patient if you operate and she dies shortly after it. In the very desperate cases let her rally from her first shock. When a woman has been an hour without a pulse, it is a serious matter to open her abdomen. You may resort to intravenous transfusion, and still she may die.

Dr. Bacon Saunders, of Fort Worth.—It is all very well to lay down a rule when and when not to operate on these cases of ruptured extra-uterine pregnancy, but it is not applicable to all cases. I have seen a woman die from primary hemorrhage within three hours without operation. Bearing this in mind, one might say, "Well, it is better to operate on all of them;" and so it comes down to the individual equation after all, and one must use his own judgment. If a woman is in a desperate condition, with no pulse, and you think she is not going to have any, and if you are sure she is not going to have any pulse, I do not think you ought to operate. I have operated on these patients without pulse, and with the exception of one of that kind they have all rallied. I have seen two within six blocks of one another in one week in consultation in the practice of the same doctor, and both of them died before they were taken to the hospital. There is a tendency to disturb men from laying down hard and fast rules, because it is a serious matter.

> "Of all sad words of tongue or pen,
> The saddest are these—it might have been."

Dr. J. Shelton Horsley, of Richmond.—There is just one feature I would like to say a word or two about, and that is this: the most serious results of extra-uterine pregnancy come from hemorrhage, and, aside from sepsis, hemorrhage is the only thing that kills these patients. The question, therefore, it seems to me, is the consideration of the best method of dealing with the hemorrhage. Some wait, others operate early. There is danger in either method if applied to all cases. Transfusion of blood has an excellent field here. It ought to prevent death from hemorrhage. Unfortunately, popular opinion holds that it is frequently followed by hemolysis, but this is erroneous. There is no case on record of death from hemolysis of the blood in

which a person who receives the blood was otherwise normal except for the hemorrhage. In other words, all deaths have occurred in individuals who had blood disease, such as pernicious anemia or hemophilia. You do not have to make an elaborate preparation. The operation can be carried out in from ten to twenty minutes with needle and thread. It is a specific for acute hemorrhage. I have used it in several clinical cases, and the technique is comparatively easy. If one has done sufficient experimental work with needle and thread, he can carry out this technique very well; or if the surgeon prefers he can use the cannula of Crile or Elsberg, both of which are good, or the tubes of Brewer may be employed.

Dr. J. W. Long, of Greensboro.—I find myself very much in accord with the views set forth by the author of the paper. I believe his conclusions are sane and sensible, and should have a salutary effect upon the practice in these cases. I have operated on ectopic pregnancy cases at almost all stages, from two hours following the primary hemorrhage to eight months after the rupture. In forty operations for ruptured ectopic pregnancy I have lost only one patient. In two of the cases only have I operated as soon as I could get the patient to the hospital. I believe that, as a rule, in a large proportion of cases it is better to wait and take time to prepare the patient, letting her recover from the initial shock. However, in the occasional case it is absolutely imperative, it seems to me, to operate at once. For instance, only a little while ago, I was called to the outskirts of our town and found a woman who was in the throes of the third rupture. She gave a history of having bled the day before and the day before that, and she was almost pulseless when I saw her. Her husband was two hundred miles away. I said, "You must be operated on at once." She replied, "I cannot consent to operation without the knowledge and presence of my husband." I said, "You will never see your husband any more unless you are operated upon, and that promptly." She was a Catholic and said, "I must see the priest." I knew what the priest would say; what he always says when he has confidence in the physician. So a message was sent for the "father" and the ambulance at the same time. After the priest talked with the woman she was put into the ambulance. I rode with her. She was pulseless when she arrived at the hospital, and if I ever literally ripped a woman's abdomen open I did hers, quickly seizing the bleeding tube. I found her abdomen full of fresh blood and clots. She made a prompt recovery, returning home in fourteen days.

I want to say, again, that these very urgent cases are only the exceptional ones, and according to my experience, nineteen times out of twenty it is quite as well or better to wait and operate

after more preparation and deliberation. I do not believe any man is justified in opening the abdomen of a woman unless his environments are favorable, even though there be a bleeding tube. He must be in a hospital, or surrounded with his ordinary assistants and proper facilities.

There is one other thing I want to say, and that is in the matter of diagnosis. We have a valuable recourse in those doubtful cases, particularly in young women who have never been pregnant, with thick, rigid abdominal walls, in the simple procedure of making a tiny incision in the posterior cul-de-sac, which will enable us to clear up the question of ruptured pregnancy at once.

Dr. Howard A. Kelly, of Baltimore.—The discussion seems to turn to the treatment of the cases in which there is profuse hemorrhage. That is a point that needs emphasis. I believe in operating on these cases of ruptured extra-uterine pregnancy as promptly as I can. I lost one patient who bled right straight on to death. We had no chance there at all to wait, and there was no improvement shown at any time.

I think I have learned recently just what to do in these bad cases of hemorrhage, and I think it will be a help. Dr. Babcock, of Philadelphia, detailed before the Philadelphia Obstetrical Society his method of treating these cases, which he has applied to some eight patients, saving them all; that is, opening the posterior cul-de-sac under spinal anesthesia, pulling down the uterus and tubes, and clamping the uterus and ovary off, cutting them off and leaving the clamp on. This is very rapidly and quickly done in some cases. I would add to that Blair Bayliss' treatment with infundibular extract. I do not know what you know about that, but it is far ahead of adrenalin, which only raises blood pressure temporarily. This acts for hours, keeps up blood pressure, and is a splendid vasomotor tonic. It comes in little capsules. You can inject one capsule, about 1 c.c., and it brings the pressure right up, and causes the pulse to act. With those two things, the administration of the infundibular extract and the quick opening of the vaginal vault, pulling down and clamping off the uterus and tubes, these desperate cases that have heretofore been lost can be saved.

Dr. J. Garland Sherrill, of Louisville.—It appears to me we ought to go into the pathology in connection with this subject. It has been claimed by the essayist that the shock in these cases is due partly to the loss of blood, or partly to the pre ence of blood in the abdominal cavity. If a vessel was bleeding in the arm, you would not hesitate a moment in saying that it should be tied. We have, in addition to the loss of blood, the presence of blood in the abdominal cavity, and this is an irritant and increases the shock. I wish to agree with Dr.

Kelly in favoring operating at once. We can build up the blood pressure of these patients much quicker when the artery is controlled than when it is leaking. If you use transfusion of blood you should clamp the bleeding vessel at once. Granting that some of these patients have got well, I do not believe the majority of them will get well unless the artery is tied. I recall one woman who died in less than three hours from ruptured extra-uterine pregnancy without operation. I have operated on cases of this kind in negro hovels, with only fair assistance, and with the best technique I could command, and have saved the patients. I have never lost a case that was operated upon for primary rupture, and I feel that it is the better plan to pursue.

Dr. Reuben Peterson, of Ann Arbor.—At first, I thought I would not enter this discussion after having listened to such a comprehensive and scientific paper as Dr. Zinke has given us. But having had some experience in opening the posterior cul-de-sac in these cases of ruptured extra-uterine pregnancy, I desire to place myself on record as disagreeing with Dr. Babcock, whom Dr. Kelly quoted, in his advocacy of this method of treating the condition. Some years ago I tried opening the posterior cul-de-sac in a number of cases of ectopic gestation, and my results were so bad that I am in a position to emphatically condemn the method. If I remember correctly, Dr. Bovée has had the same experience. It is not so easy as it would at first appear to seize the bleeding tube with forceps through the posterior cul-de-sac. If one is going to operate from below, it is far better to open the anterior cul-de-sac, for through this opening it is much easier to seize and ligate the tube. If the placenta or sac lies at the bottom of the pelvis, such a profuse hemorrhage will follow the opening of the posterior cul-de-sac that the operator often is obliged to pack with gauze to control the hemorrhage. A repetition of the bleeding or sepsis is only too apt to follow subsequent removal of the gauze.

Perhaps in discussing the treatment of the condition we have neglected the diagnosis, which is equally interesting and important. Given a patient with a history of having skipped two or three periods, a sudden pain in the pelvis, accompanied by shock with a mass in the pelvis, it is perfectly easy to make a diagnosis of extra-uterine pregnancy. Yet one soon learns that one or more of these classical signs as laid down by the text-books is apt to be wanting in the condition under discussion. It is not uncommon to overlook ruptured ectopic gestation and to consider the mass in the pelvis to be inflammatory because of the indefinite history, and because a certain amount of pelvic exudate has been thrown out around the ruptured tube. Hence it is now my custom to explore with a needle any posterior

cul-de-sac mass where the history is at all doubtful. If pus be present, it should be evacuated by a posterior incision. In case, however, the exploratory puncture reveals blood, the mass should be attacked from above.

In my own practice I have never seen a patient die suddenly from loss of blood through rupture of the tube. Still, such cases are reported, although they must be very uncommon. Usually there is plenty of time after the rupture occurs to stimulate the patient and carefully prepare for an abdominal operation.

With reference to Dr. Horsley's suggestion, it may be said that while direct transfusion is an excellent procedure, it requires considerable experience, and might not prove as efficacious as some other method in the hands of the average surgeon.

Dr. T. J. Crofford, of Memphis.—I have had some experience in cases of ruptured tubal pregnancy. I have seen two women die from the first hemorrhage within two or three hours from the time they were taken ill. They had no pulse when I saw them; not in condition to encourage operation. However, I was determined, in the future, to do something rather than let them die without an effort being made to save them. In the next case I had there was a hospital near by. One of the internes in that hospital, who was in the habit of making transfusions into the arm, was sent for. He came with his transfusion instrument, and filled that woman's vessels with salt solution, starting to give the salt solution just before the operation was begun. I suppose in thirty minutes after I got into the house the abdomen was opened and the bleeding vessel clamped. This woman recovered. I had two more cases in the same town; in both the saline solution was given at the time of the operation; these women rallied afterward and all three got well, but the first two, for whom we did nothing, died. This has been my surgical experience in desperate cases of extra-uterine pregnancy.

CESAREAN SECTION, WITH SPECIAL REFERENCE TO THE TIME OF OPERATION AND ITS TECHNIQUE

By Lewis S. McMurtry, M.D.
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One familiar with the history and progress of abdominal surgery cannot fail to have been impressed with the similarity in the development of ovariotomy and Cesarean section. The latter operation is much older than ovariotomy, the indications for its application are less definite and positive, and it has been universally regarded as a final and desperate effort at delivery when other measures have been tried and have failed. Like the early development of ovariotomy, the Cesarean section has been fostered under the care of a few operators, who have struggled on in their efforts despite the discouragement of a heavy mortality. That the Cesarean operation is so far behind ovariotomy and hysterectomy in professional favor and in general application when indicated, is due for the greater part to the fact that the surgeon competent to do the operation rarely has access to the patient until she is exhausted, often infected, by futile efforts at instrumental delivery. With patients afflicted with ovarian and uterine tumors no other operation is considered prior to ovariotomy and hysterectomy, and the operations are eminently elective, instead of being, as too often obtains with the Cesarean section, operations of emergency.

The patients requiring delivery by abdominal hysterotomy who are so fortunate as to be confined in maternity hospi-

tals, where every modern facility and surgical skill are at command, compose only a small proportion of the great number who meet the same issues of life and death amid the disadvantages of confinement in their own homes.

The late Dr. R. P. Harris, of Philadelphia, writing in 1889, reported that there had been 175 Cesarean operations in the United States with 110 deaths. He also states that from April, 1884, to February, 1885, 6 Cesarean sections were done in this country, and all of the mothers and children died.[1] Lusk reports, upon high authority, that in the Lying-in Hospital in Vienna, during the nineteenth century up to 1880, not one single woman had survived after Cesarean section. Upon equally high authority, he reported that in Paris, up to 1873, there had not been one successful Cesarean section in eighty years. I beg to follow this report of Lusk showing the results of the operation prior to the antiseptic era, and the report of Harris after the antiseptic era, but prior to the perfection of aseptic methods and before the general adoption of Sänger's technique, with present-day results.

In Germany the operation has attained a high degree of perfection in the hands of Sänger, Leopold, and Olshausen. The latter (Olshausen) has reported a series of 65 cases, with a mortality of 4.6 per cent. Reynolds, of Boston, reports, in 1907, 30 cases without a death. In all these cases the operation was *primary;* the operation was elective, and the patients had not been subjected to repeated examination and efforts at delivery. These results mark the standard that can be attained by early examination, hospital facilities, and surgical skill.

Dr. Asa B. Davis, of the Lying-in Hospital in New York, reports (September, 1910) that in a service of 68,200 obstetrical cases at that hospital, there were 256 Cesarean sections performed. The maternal mortality is 14.06 per cent.; the fetal mortality, 20.08 per cent. Of this number, 78

[1] American System of Obstetrics.

operations were performed by Dr. Davis, with a maternal mortality of 16.67 per cent. Of these 13 deaths, the report gives among causes of death the following: "Prolonged labor, sepsis, suppression of urine; midwife in charge for twenty-four hours;" another, "prolonged labor, sepsis before admission to hospital;" and "prolonged attempt at high forceps by private physician, general streptococcemia." Twelve of these 67 women have had repeated Cesarean sections; one has undergone the operation three times, and one five times. In some of these cases the operation was necessitated by multiple sarcoma of abdominal and pelvic viscera, by carcinoma of cervix and vagina, and there were 7 cases of eclampsia. A study of this report will convince one that if every reasonable advantage be utilized, the operation be not delayed, and the patient is not infected beforehand, this operation can be done under proper hospital conditions, in uncomplicated cases, with a mortality as low as that of ovariotomy.

As with all abdominal operations, the splendid results of the present time have been made possible by the discovery and perfection of aseptic surgery. In 1876, Porro made the great contribution to the operation which has forever attached his name to the radical operation. To the Cesarean section as previously performed he added hysterectomy. By this procedure both hemorrhage and sepsis were materially lessened. It gave a great impetus to the operation, and in labor complicated by uterine neoplasms will remain a standard and perfected operation. The greater number of the Cesarean operations done by the writer have been based upon this indication, and consisted of the Porro operation with retroperitoneal treatment of the pedicle. It is an ideal operation under such conditions.

In 1882 Sänger made his epoch-making contribution to the technique of Cesarean section. Previous to this time, after incision of the uterus and delivery of fetus and placenta, the uterine walls were left to be approximated by the physio-

logical contraction of the uterus. Sänger demonstrated the importance of suturing the uterine incision with deep sutures down to, but not including, the uterine mucosa, and adding a neat suturing of the peritoneum over the entire length of the incision. As a result of Sänger's addition to the technique of the operation, and the simultaneous improvement in aseptic surgery, the operation was at once followed by unprecedented success and has attained its present high place as an operation of choice.

The operation as practised by Sänger consisted of the median abdominal incision midway of the abdomen, turning the uterus out of the abdomen before opening it; two or three sutures were placed at the upper angle of the abdominal incision and tied after the uterus is delivered to protect the subjacent peritoneum; a sheet of rubber was then placed beneath the uterus to protect the lower peritoneum; the cervix was constricted with rubber tubing to control hemorrhage; the uterus was incised through its anterior wall vertically; fetus and placenta delivered; the rubber tube removed as soon as uterine contraction obtains; the uterine sutures were of silk and were placed as already described; before any of the sutures were tied the uterine cavity was washed out with an antiseptic solution, and the uterine cervix dilated to assure drainage. The uterus was then returned to the abdomen and the abdominal incision closed.

As in all abdominal operations, this operative procedure, as devised by its author, has been simplified with experience. It was soon discovered that the elastic tube placed around the cervix produced atony of the uterus and predisposed to postpartum hemorrhage. Also, that it frequently encircled the child's head and interfered with delivery. The constricting tube was first replaced with manual compression of the uterine arteries by an assistant. Later, even this was found to be unnecessary, as the hemorrhage can be effectually controlled by the pressure of a gauze towel packed into the uterine incision while the sutures are being placed.

The uterus need not be brought out through the abdominal incision, and all exposure and handling of the abdominal viscera should be avoided. At the beginning of the operation an assistant should place his hands flat upon the abdominal wall, one on each side, hold the uterus steady, and keep the abdominal wall closely in apposition with the uterus. A double tenaculum at the upper angle of the uterine incision, another fixed in the lower angle, will give the operator perfect control of the uterus while incising and suturing that organ. The utmost care should be observed to protect the peritoneum from the amniotic fluid. Davis assures us that in no instance has he found it necessary to dilate the cervix to secure drainage. No application of any kind should be made to the uterine cavity after the fetus and placenta have been delivered. The suture material best adapted for the uterine incision is chromic catgut No. 2. The after-treatment is the same as that of other abdominal operations.

The operation should be performed with the same deliberate care and expedition as are observed in other abdominal operations. There seems to be a general impression on the part of surgeons that exceptional rapidity bordering on haste should characterize the steps of the operation. There is no valid reason for this.

Davis makes the abdominal incision above the umbilicus, and the uterine incision just below the fundus of that organ. I do not believe the site of the incision is of essential importance. The abdominal wall at the full term of pregnancy is thin and relaxes easily. As soon as the abdominal incision is made and the uterus exposed, long gauze pads wrung out of warm salt solution are placed within the abdomen to hold back the omentum and intestines and protect peritoneal surfaces while the uterus is being emptied and closed.

Unfortunately, in the majority of cases the operator has no choice as to the time of election for the operation, the patient being usually in active and prolonged labor when he is called upon to operate. When the patient is under obser-

vation in advance, and choice of time for operation can be made, it is preferable to operate after labor has assuredly begun. To elect this time from the menstrual history is inaccurate, and will not infrequently result in the delivery of a premature child. No dilatation of the cervix or preliminary vaginal operation, other than thorough cleansing of the vagina, should be done.

With the demonstrated results of Cesarean section as now obtains the scope of the operation must necessarily be widened and its application greatly extended. What is most needed at the present time, and this thought has inspired this paper, is an active interest on the part of all abdominal surgeons, and such a campaign of education as was successfully applied some years since in behalf of early operation in other conditions requiring prompt surgical intervention. It is established that the *primary* Cesarean operation in skilled hands has a mortality quite as low as uncomplicated ovariotomy and clean hysteromyomectomy. With repeated examinations, cervical dilatation, and application of forceps, carried out with crude and desultory observance of aseptic precautions, the mortality of abdominal hysterotomy is unnecessarily increased. The coöperation of the surgeon and the general practitioner is necessary to correct this fatal error

DISCUSSION

Dr. E. Gustav Zinke, of Cincinnati.—The paper of Dr. McMurtry is, like all of his productions, classic in character. If the mortality of Cesarean section today is still too high, it is because of the carelessness or indifference on the part of the gentlemen who attend obstetric cases and do not give them the attention they demand. Unfortunately, or fortunately, the act of birth is so often successfully accomplished by nature's own efforts that many become careless in the management of these cases prior to as well as during labor. One of the essentials, one that should never be overlooked, is that the physician should study the case carefully and completely. It is in this connection that most mistakes are made. Because a woman is in good health, seemingly well built, and the child in a favorable pres-

entation and position, it is concluded that all is safe and she is permitted to go to the end of term. The obstetrician in very many instances has no distinct knowledge of the capacity of the patient's pelvis, or of the position of the presentation of the fetus. A protracted labor arouses, perhaps, the first suspicion that something is wrong, and after loss of valuable time and probably vain efforts at delivery, it is discovered that a timely hebosteotomy, Cesarean section, or version, might have saved the life of both mother and child.

Dr. E. S. Lewis, of New Orleans.—I have been very much interested in the paper read by Dr. McMurtry, inasmuch as I covered very much the same ground last year in a paper read at the meeting of the Louisiana State Medical Society. My paper, however, has not been published.

In the enumeration of the cases compiled by Dr. Hirst, of Philadelphia—it may be a little vanity on my part to state it—he credited Louisiana with having furnished the largest number of successful Cesarean sections, ascribing this success, however, perhaps to the greater ability of the Louisiana surgeons at that time because they were French surgeons, who came over to Louisiana during the revolution and during the various governmental changes that took place in France. I am not here, however, to enter into a discussion of the relation of the Cesarean operation performed in this country, but merely to mention the fact that Louisiana has the credit of having furnished the largest proportion of successful cases.

I fully agree with the remarks that have been made by the gentleman who spoke last (Dr. Zinke), that we are, as a rule, rather heedless in undertaking obstetrical cases. I think the obstetrician should thoroughly examine every patient whom he expects to confine, not only to determine the presentation of the fetus, but to correct any malpresentation of the fetus, if possible; also to determine upon the condition of the pelvis by proper mensuration. As the essayist has stated, the statistics prove that the Cesarean operation, the primary operation, is not attended with any more gravity than the removal of a simple ovarian tumor. I fully agree with him in that statement, and that the danger is proportionate to the length of time the woman has been in labor, whether she has been examined or not. There is greater danger, of course, if frequent examinations have been made, or if instruments have been used, on account of infection, as well as the shock which doubtless prolongs the labor. We are going to meet, however, with the same trouble that was met with in the early days of the removal of the tubes and ovaries, and a larger number of Cesarean operations will be performed than the condition of the patients will justify. I have read even of the operation being proposed in the case of

women marrying late in life, in whose cases a rigid cervix and rigid perineum, it was feared, would render labor by the natural passages difficult. There have been articles written on that subject. We know that while there may be difficulty, the majority of such women go through labor without any complications, and we do not know whether these cases will not do as well if we let them alone as if we operate on them. This is a feature for us to take into consideration, and if the Cesarean operation has not been revived before now, it is owing to the desperate mortality which it has had in the past, from which the medical profession has not recovered.

Dr. Reuben Peterson, of Ann Arbor.—I simply rise to express my appreciation of this most timely paper by Dr. McMurtry, and to say that I am in hearty accord with the points that have been brought out in the discussion. If there is one subject in the whole range of medicine that has been neglected in the last twenty years, it is obstetrics. This can be explained in a way by the greater pecuniary rewards which have accrued to abdominal and other kinds of surgery, with the result that in this country obstetrics has been neglected. Obstetric teaching, in many instances, has been turned over to men who were unable to earn their living and properly teach the subject, so that many practitioners have been turned out from our medical schools without an accurate idea of what to do for a woman during pregnancy, or how to size up a difficult case before labor. Now, the general practitioner retains his obstetric patients if he can. His surgery oftentimes is absorbed or done by specialists, but from time immemorial he has done his obstetric surgery, and has not called in a consultant, except when obliged to. It is unnecessary to go into a lengthy explanation of why this is so, but it is true. In obstetrics there is less consultation work than in any other department of medicine. The result of it is that the specialist is only called in after the practitioner has endeavored and failed to deliver the woman by the natural way. Usually, when that time comes, it is not a case for Cesarean section.

We have heard the statistics from New York, quoted by Dr. McMurtry. It seems to me such statistics illustrate a mistake just as great as not to perform Cesarean section at all, because Cesarean section should never give 14 per cent. mortality. When a woman is septic, certainly Cesarean section is not indicated and should not be performed. Look at the difference between 14 per cent., as given in these two or three hundred cases of Cesarean section, and Dr. Reynolds' 30 cases without a death. And in the same series of cases, where the operation was elective, there were 80 cases with only one death, and that was due to an accident. If there is one thing we are sure of, it

is that if a woman has been examined and is septic, that case is not a proper one for Cesarean section, and we should so instruct.

It seems to me that the time is coming when the operation of high forceps will not be taught in our medical schools. High forceps are put on when the head has not entered the pelvic inlet, that is, where there is some disproportion between the head and the superior strait. In my opinion Cesarean section will give far better results to the woman and to the child than will the operation of high forceps. Hence I believe the time is coming when the application of high forceps will not be taught as an obstetric procedure.

Dr. McMurtry (closing).—I am grateful for the commendation given my paper in its discussion, and in closing would only reiterate that my purpose was to bring to the attention of the Association a much neglected subject. That Cesarean section must not be considered until all other methods of delivery have been repeatedly tried, and that it is proper to submit the patient to repeated and unnecessary examinations, is the impression current among the great body of medical practitioners. This attitude toward the operation is incorrect and leads to many avoidable fatalities. This error can be corrected by dissemination of the facts presented in the paper, and the proper application of the modern Cesarean section will result in an enormous saving of human lives.

COMPLETE ABSENCE OF THE VAGINA: AN OPERATION FOR THE FORMATION OF A PLASTIC VAGINA

By Alex. H. Ferguson, M.D.
Chicago, Illinois.

The creation of a vagina by plastic operation has not yielded uniformly satisfactory results. The procedure here presented does not pretend to produce a normal vagina, still, in two of the three cases to be reported, a vagina has been formed which yields satisfaction to both husband and wife. The third patient, the last operated upon in this series, is now married, and upon examination the capacity of the plastic vagina may prove as efficient as that of the first two cases.

1. The first patient was a very beautiful, charming, accomplished, and attractive young lady, aged eighteen years. The external genitalia were fully developed with the exception of a complete closure of the vaginal outlet. She was engaged to be married, and her mother, knowing that she had never menstruated, insisted that her daughter should submit to an examination. This was done with the consent of her fiancé. I reported to him that the girl had no vagina, probably no uterus or other internal organs of generation. In order to determine the extent of the condition, I advised an exploratory laparotomy. This operation would not only determine the complete diagnosis, but would afford an opportunity of observing the possibility of forming a vagina from the material present.

The abdomen was opened suprapubically in the median line, and examination disclosed complete absence of the vagina, uterus, left tube, and ovary; a rudimentary tube and ovary were present on the right side. The first operation, as described below, was a failure; the second, the operation recommended in this paper, was a complete success, and the patient is happily married to the same young man. I might here interject that while coitus is not disagreeable to her, she does not enjoy any of the special qualities related thereto, being absolutely passive in this connection.

2. The second patient was also an exceedingly well developed young woman, aged thirty-four years. The breasts were large and sensitive, the external genitalia were fully larger than normal. She had been married for seven years, was exceedingly amorous, and marital relations with her limbs together was more satisfactory to herself than to her husband. She was referred to me for the removal of a chronically inflamed appendix; at the same time it was suggested by the local doctor that if I could do anything for her sterility, they would be well pleased. The doctor had made a physical examination and was aware that she had no vaginal outlet.

The abdomen was opened through the right rectus muscle and the inflamed appendix removed. Further examination disclosed that the patient had neither vagina nor uterus. Rudimentary tubes and fairly well developed ovaries were, however, present. The large area of vulvular mucous membrane available made the plastic operation easy to perform and the result was highly satisfactory.

3. The third patient, recently operated upon, is a sister of the first. I examined this girl at the time I operated upon her sister, but on account of her youth, fifteen years, and small vulva, I determined to postpone operative interference until she had reached maturity. The young lady went to Paris for accomplishments and returned a few months ago,

anxious to have the operation performed. Owing to the existence of chronic appendicitis—she had four distinct attacks—the abdomen was opened, the appendix removed, and the diagnosis made absolute regarding her internal organs. A small nodule, the size of a pea, represented her uterus, and there was no sign of a vagina. There were present two rudimentary tubes and two small ovaries. The labia minora in this patient were smaller and the mucous membrane less expansive than in the other cases. The result here obtained is fair. A slough at the apex of the left flap occurred and resulted in cicatrization at this point. For this reason, the vagina is diverted slightly to the right, but may be satisfactorily straightened out. She was married last September.

Operation. While the technique of the operation here recommended, varied slightly in the three cases, still, the principles underlying the procedure were the same, viz.:

1. To utilize the available mucous membrane.
2. To form three flaps.
3. To tunnel through the perineum, behind the bladder and in front of the rectum, dissecting the peritoneum from both these structures without opening the peritoneal cavity.
4. To invert the flaps into the tunnel thus formed and to suture them in place with catgut.

This illustration (Fig. 1) represents the first step in the operation. It shows the manner of fashioning the flaps and their extent. It will be noted that the lateral flaps include the mucosa of the labia minora on either side; care is taken, however, not to interfere with the mucous membrane in connection with the clitoris and meatus urinarius. The central flap, hinged at its base near the meatus urinarius, is made as thick as possible, especially at its base, in order that the nutrition may not be interfered with. The lateral flaps are formed with the same precautions in mind.

Fig. 2 represents (*a*) the central flap raised upward, (*b*) the lateral flaps fully liberated, (*c*) a stump of mucous strip

membrane on either side which is not dissected up; it serves the double purpose of being sutured to the base of the labia majora on the outer side and to the borders of the lateral flaps on the inner. At this stage, the anterior surface of the levator ani muscle on either side is sought and cut transversely to obtain an unobstructed tunnel through the perineum. If this is not done, the new vagina will be hour-glass in shape. The peritoneum is separated from the rectum, pushing the former upward, and denuding the anterior surface of the rectum as high up as desired. The rectum is dragged downward with double tissue forceps and a similar and careful denudation is made from the bladder. Space should be made to freely admit three fingers; the object should be to create a tunnel much larger than to receive a normal penis. Then a speculum is placed in the cavity and the rectum and perineum are retracted as well back as possible. The apex of the central flap is then sutured to the base of the bladder, as high up as possible, with three catgut sutures. The bladder is then allowed to drag the flap well up into place. The retractor is then turned toward the symphysis and the denuded rectum is dragged down into the field. The apices of the lateral flaps are sutured to the rectum with catgut; two or three sutures along the lateral margin of the flaps tend to prevent them from rolling up. There is no difficulty in spreading the lateral flaps like wings. The three flaps do not entirely cover the raw surfaces of the tunnel, the borders of the flaps are nowhere stitched together, except in front of the anus, where two sutures are placed to keep the flaps spread out. The fact that the flaps are not sutured together all the way renders the cavity dilatable to an ideal extent. Horsehair is used to close over the raw surface of the denuded areas.

An artificial penis is now made from a roll of gauze; this is covered with thin rubber. The length is about seven inches and the diameter about one inch and a half. The rubber is anointed with sterile vaseline and zinc oxide and the dressing

is inserted into the plastic vaginal canal. The external end spreads out like a flange and is held in place by a firm pad. Two strips of adhesive plaster cross each other at the centre of the plug in such a manner as to avoid the meatus urinarius and the anus. The plug must not be constricted by the levator ani muscles and must not fit too tightly.

After Treatment. The initial dressing must not be withdrawn for six or eight days. During this time a careful nurse keeps the parts as aseptic as possible. A short, bulbous retention catheter is left in the bladder unless the patient is thereby rendered uncomfortable. If this is the case, the patient must be catheterized.

Very little nourishment is given while the plug is *in situ* —the patient is constipated by opium and, if necessary, by acetate of lead. Albumen water is an excellent form of nourishment in these cases, and is only given by mouth. It is remarkable how the laudanum not only relieves the pain, but allays hunger and thirst.

At the end of a week the flaps are adherent by granulations over their entire extent. The plug is now withdrawn and the vagina gently dilated with a glass speculum of suitable size or the electric proctoscope. Inspection is made of every part of the canal and it is cleaned with normal saline solution. If any antiseptic solutions are used, epitheliazation will be interfered with, as it is in the use of Thiersch grafts. A similar plug is inserted every few days for three weeks. By this time, epitheliazation is complete and the union of the flaps is secure by mature fibrous tissue. If exuberant granulation tissue appears during this time, it should be levelled down with a solid stick of silver nitrate or sulphate of copper, and the plug again inserted.

Purgatives and a copious enema are given when the primary plug is removed. Later a respite from the plug may be allowed for a half day while the patient is being disturbed by cathartics. To obtain ideal results the vaginal plug must be attended to by the surgeon.

The internal stitches are catgut and may be left to become absorbed or loosened. The horsehair had better be left in place two weeks.

In the after treatment of these cases, *absolute cleanliness "without antiseptics"* is of primary importance. The patient must remain under observation for at least three months.

Fig. 4 represents a median sagittal section (diagrammatic) of the body after the formation of a plastic vagina.

CASE I.—The patient, a young woman, aged nineteen years, presents herself at my private hospital on December 28, 1905. The patient is a well developed girl, weighing 150 pounds, who gives a history of never having menstruated. She is of a nervosanguine temperament, is very modest—in fact, shy and bashful. The girl has suffered no ill health at any time. She is clever at her studies and requires very little sleep, almost bordering on insomnia. There is no molimia. Only the fact that she was engaged to be married and was not sure of her condition would lead her to consent to an examination. Her fiancé said he would marry her anyhow, and was not particular whether she was normal or not.

She was prepared for operation and an anesthetic given before the examination was made.

Physical Examination. The breasts are large and full; there is abundant pubic hair. The mons veneris, labia majora and minora, and clitoris are very fully developed. There is no trace of a hymen and in its place is a firm, thick mucous surface. Bimanual examination, with two fingers of the left hand in the rectum, and right hand pressing above the pubis could not detect any organs of generation. A large sound was passed into the bladder, its beak was turned toward the rectum to meet the fingers in the bowel. No uterus could be detected in this manner.

The abdomen was opened and a club-shaped appendix removed. The Trendelenburg position was used and the pelvic structures brought clearly into view. There was

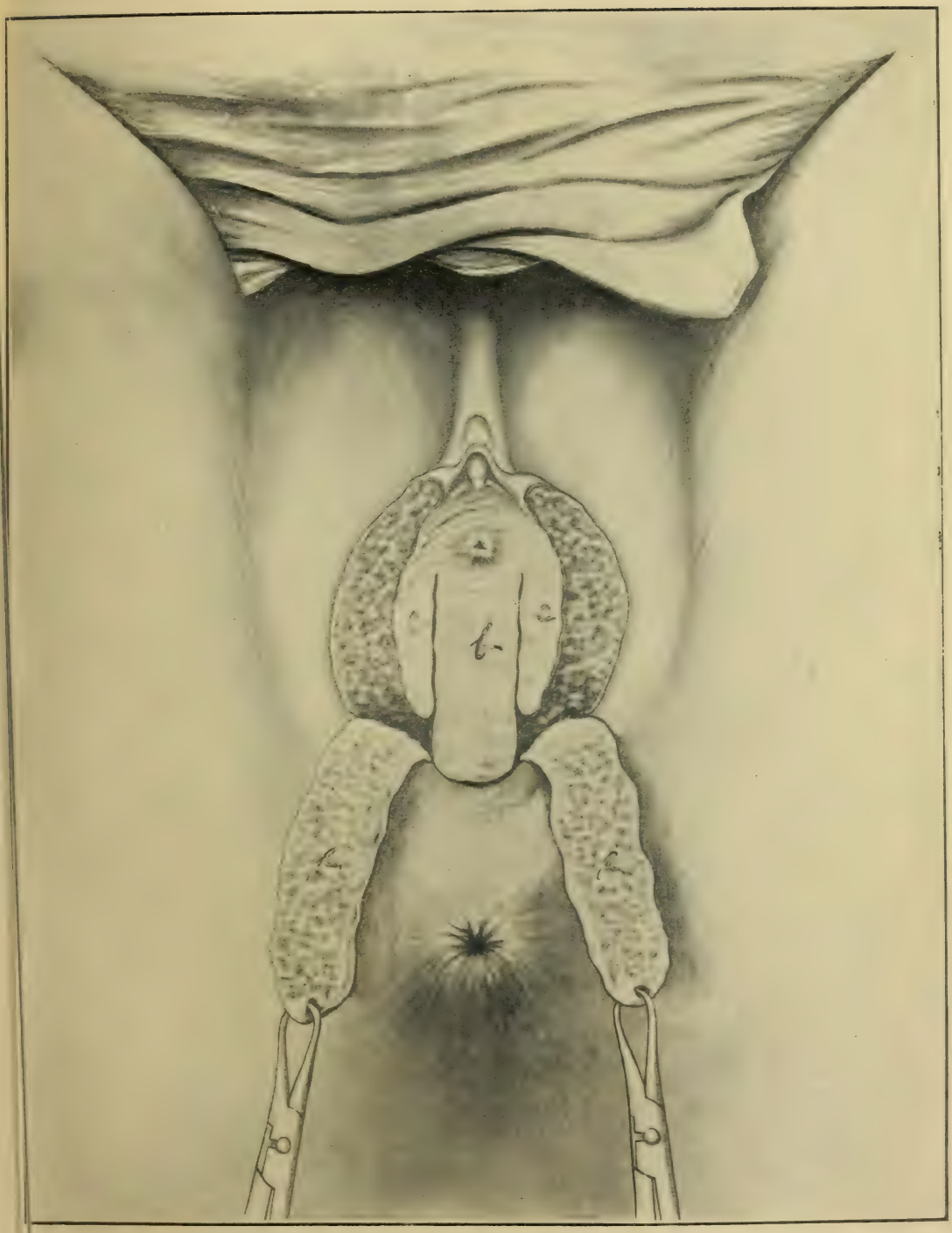

FIG. 1.—*a*, labia minora formed into a flap; *b*, central flap; *c*, strips of mucous membrane left attached.

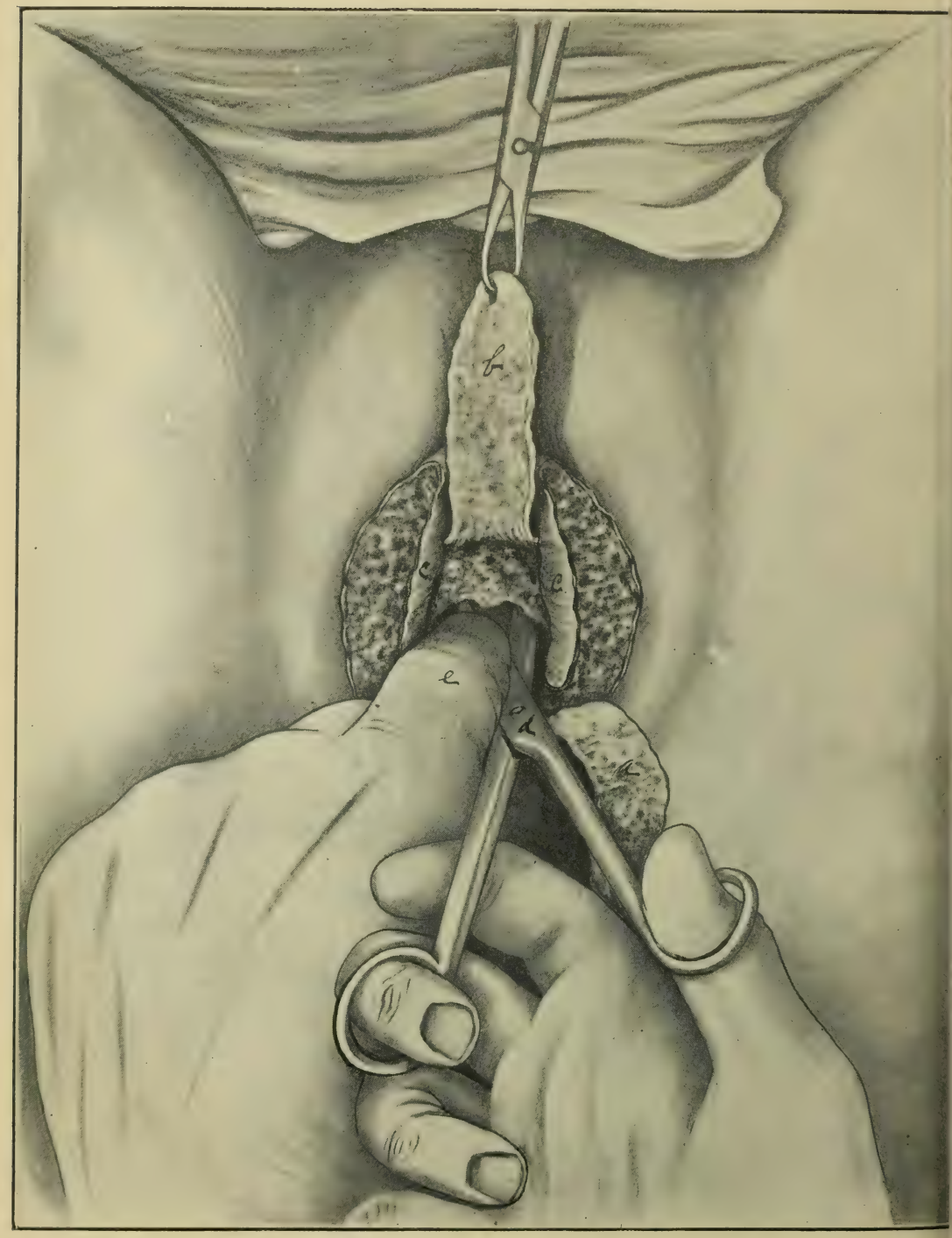

FIG. 2.—*a*, labia minora flap; *b*, central flap dissected up; *c*, lateral straps of mucous membrane; *d*, scissors in the act of dissecting, guided by the finger; *e*, index finger inserted between the bladder and rectum.

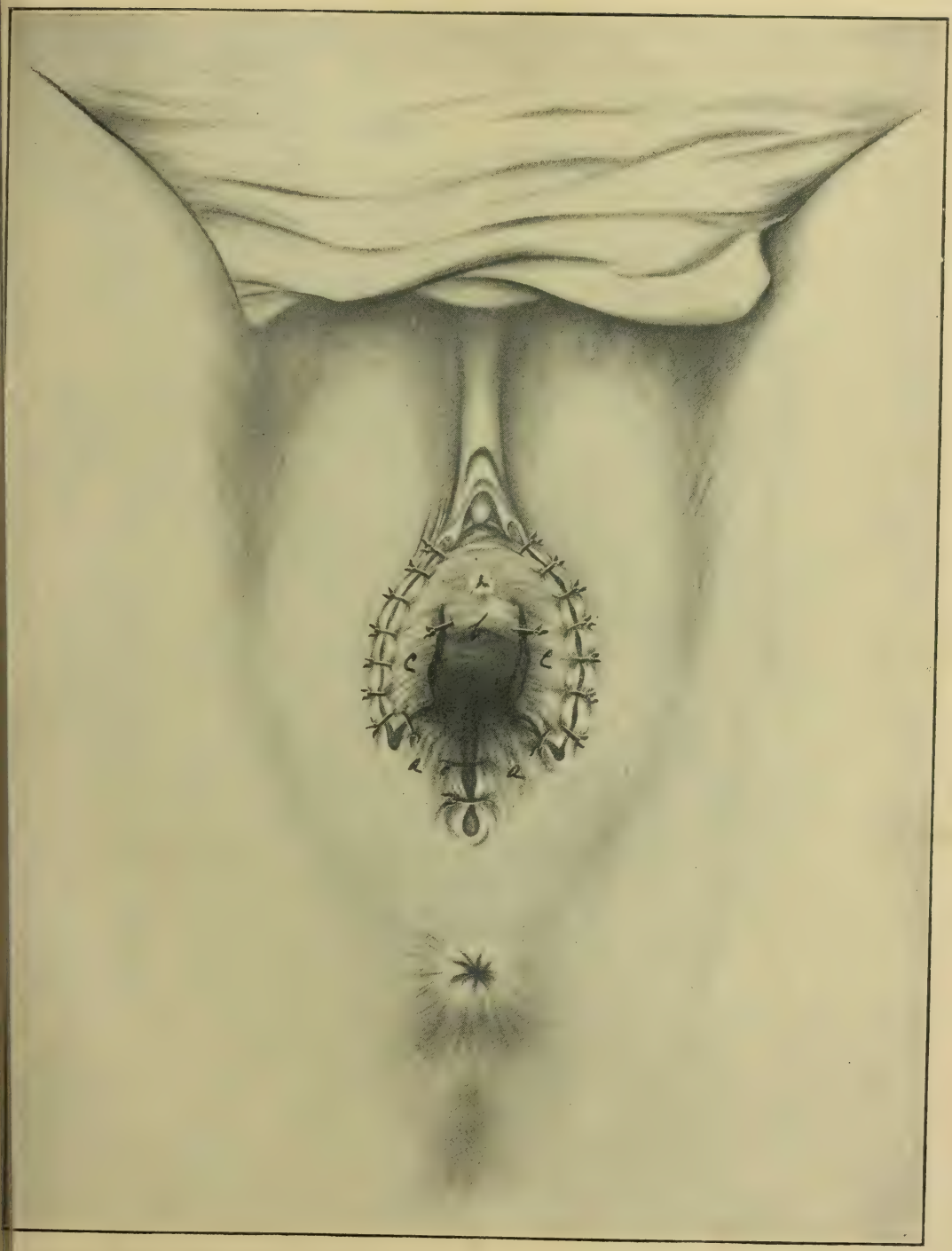

FIG. 3.—This drawing shows the horsehair sutures inserted and the flaps inverted to line the new vagina. *a*, central flap; *b*, central flap; *c*, lateral strips of mucous membrane.

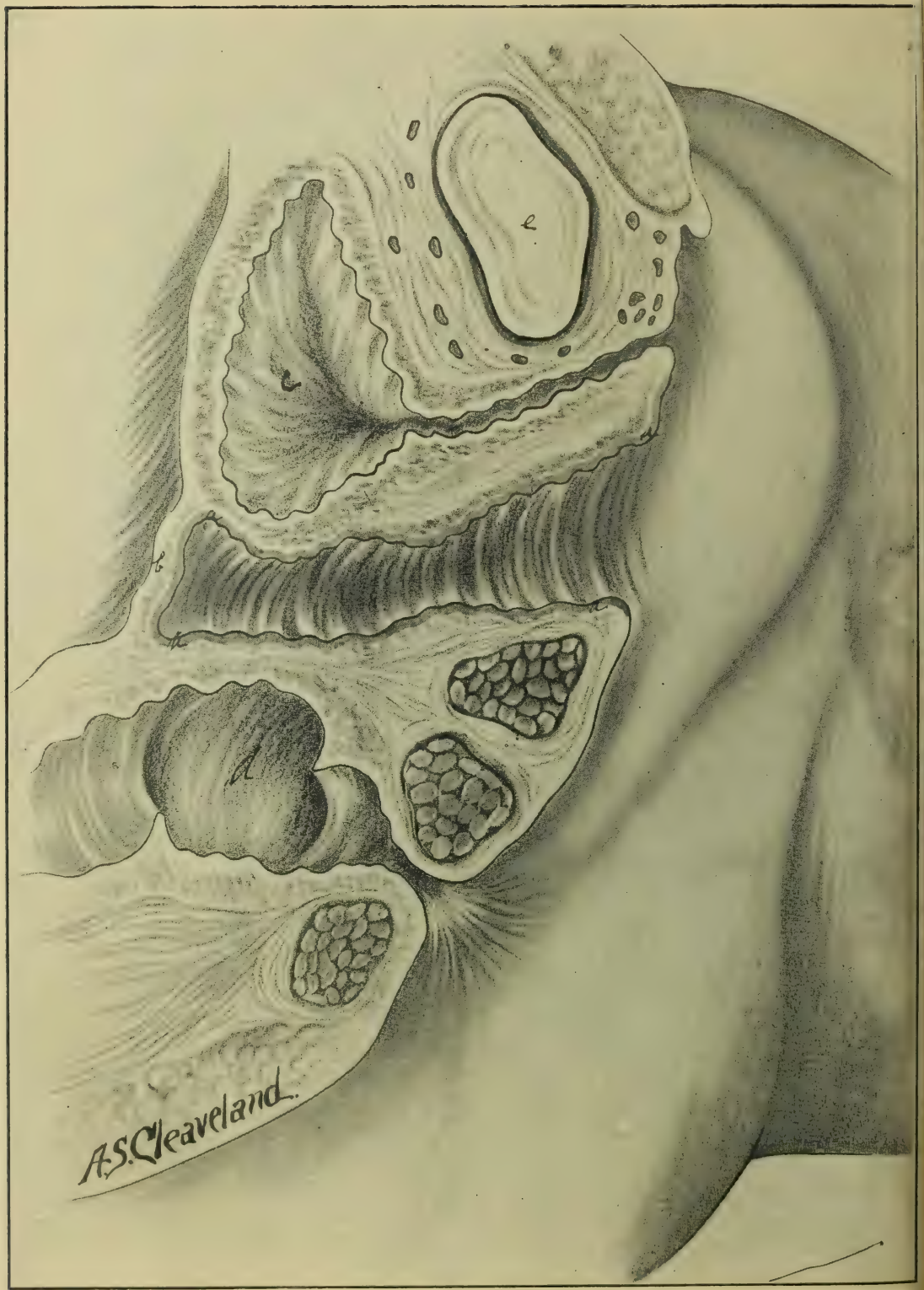

FIG. 4.—Diagrammatic sagittal section, showing the new vagina. *a*, mucous membrane; *b*, peritoneum; *c*, bladder; *d*, rectum; *e*, symphysis.

complete absence of vagina, uterus, left tube, and ovary; a rudimentary tube and ovary was present on the right side.

A circular incision was made in the mucous membrane surrounding the occluded vaginal outlet. The fingers were pushed up into the pelvis toward the rudimentary tube and ovary. The peritoneum covering the dome of this raw tunnel was not interfered with. The dome was stitched close to the rudimentary tube and ovary. The tunnel was packed with iodoform gauze and the abdomen closed. The gauze was removed in eight days and renewed. Various means were used to prevent contraction, but to no avail; at the end of two weeks contraction commenced. The only thing gained by the operation was an accurate knowledge of the congenital deficiencies in her pelvis and a small pouch for a vagina.

The second operation was performed May 23, 1906. Epitheliazation and complete healing had occurred. The operation and technique recommended above was again employed as above described. I paid personal attention to the after treatment. The patient left the hospital on the twenty-second day with a straight vagina, larger than normal at the outlet. She afterward married and is very happy. I made examinations of her, the last one on November 5, 1909, and was able to pass two fingers full length well up into the plastic vagina. I then passed a medium sized Ferguson glass speculum about four inches long, with ease. She is capable of contracting the canal by the action of the sphincter vaginæ and the levator ani muscles. The patient possesses no sexual desires, but is fond of being caressed and loved. In conversation with her husband, he said: "I am perfectly satisfied with my girl."

Case II.—A florid, healthy woman was referred to me for the removal of a chronically inflamed appendix, and incidentally for sterility. She is the wife of a farmer and rancher, and often aids her husband in rounding up cattle. Being fond of out door sports, she has become not only a

splendid horsewoman, but an excellent shot. Her maternal instincts were highly developed and she was anxious to have children. Her sexual desires were easily aroused, and in close relationship with the male organ would have a normal orgasm, although connection was not made in the normal manner. It was from a desire to have children that they wished this function improved upon. The patient never knew that she ought to menstruate until told so by her married friends.

Physical Examination. The breasts were large and sensitive. The external genitalia were fully larger than normal and the parts were normally sensitive. There was no trace of a vaginal outlet.

On August 6, 1909, she was taken to the operating room and the abdomen opened through the rectus muscle. The appendix was removed and examination disclosed complete absence of the uterus and vagina. The ovaries and tubes, were, however, fairly well developed. The inner ends of the tubes converged to a point close to the base of the bladder to a nodule which represented the uterus.

In this case, the abdomen was left open until the formation of the vagina was completed. Thus it was easy to follow the peritoneum as it was dissected from the rectum and bladder. Suture of the flaps was accurately determined with the abdomen open, and it was a great comfort to know that the plug did not press too tightly upon the bladder, rectum, or peritoneum. The abdomen was closed and the plug inserted and dressed in position.

All went well until the twelfth day, when the plug came out of the vagina. I was out of the city, and the interne, with better intentions than skill, made a new plug, larger and thicker than the first one, and forced it into the canal. Such pain was caused as to require morphine. He kept the plug in place for forty-eight hours. I examined her at the end of this time, and found her suffering a good deal. To my horror, I discovered fecal matter in the vagina. I

directed a normal saline douche, large doses of ol. ricini, in order to clear out the intestines of everything. The rectum was irrigated with boric acid solution. This required twenty-four hours' time.

The patient was then fed on albumen water and given laudanum (minims xx, every hour) until the pupils were contracted, and then she was kept chronically drowsy for a week. A shorter and smaller plug was used. This simple treatment sufficed to close the fistula. It must be stated that the fistula occurred at the apex of the new vagina.

The patient left the hospital in twenty-one days, and since that time I have not examined her, nor will she allow her physician to do so. She reports that she is perfectly satisfied with the result of the operation and has connection in the normal way. In a letter, dated November 1, 1909, she says: "I am physically normal and the marital relation is completely and satisfactorily changed."

Case III (Sister to Case I).—Operated October 2, 1909. Discharged from the hospital October 25, 1909. The patient is a slender girl, weighing 112 pounds, height five feet two inches. She is an accomplished dancer and singer, and is a great favorite with both sexes. She needs very little sleep. Like her sister, insomnia is slightly in evidence. She has never menstruated, but has a slight monthly molimia, slight indisposition, and lasting only for a day. One year before the operation she had the first attack of appendicitis, later had three attacks of less severity. In September, the girl returned from Paris for the express purpose of having the appendix removed and the plastic vagina formed.

Physical Examination. For her size, the breasts are normal, but the genitalia are small.

On October 2, 1909, the appendix was removed and the diagnosis of absence of the vagina and uterus made certain by inspection. However, there were two small ovaries and tubes, but no sign of a uterus.

The operation and after treatment was the same as

recommended in this paper. Complete epitheliazation was secured and a vagina capacious enough for a girl of her size was made.

On examination, December 11, 1909, I found the vagina deviated slightly to the right, somewhat hourglass in shape, but admitting two fingers into the lower two-thirds, and only the index finger into the upper portion.

The clitoris and labia majoræ are disagreeably sensitive. This is contrary to the condition which existed before the operation. The abnormality will likely subside, though hastened by treatment, spontaneously.

The young lady was married in September, 1910, and was examined a week afterward.

Should any further operative procedure be necessary in this case, I propose simply to enlarge and elongate the present vagina and skin graft to the upper raw surface to the extent desired. This can be readily done by stitching the skin graft with 00 plain catgut onto the plug that is used and then inserting it with the graft on in such a manner that the raw surface of the grafts will come in contact with the raw surface of the tunnel. In fact, I can see no reason why this procedure should not be tried first.

Literature. While a few futile attempts at the formation of a vagina in complete congenital absence of the vagina have been made, numerous operations have been devised and carried out with more or less success for atresia of the vagina.

Bland (Keen's *Surgery*, vol. v.) describes a plastic operation utilizing one or both labiæ to form the lining of a new canal. Carl Beck has constructed a vagina by making an incision over the pubis and dissecting the peritoneum from the bladder down to the retrovesical space. A counter opening is made in the space between the urethra and rectum to meet the first. Two skin flaps from the inner side of the thigh, having as a base the labia, are dissected up and carried into the canal and sutured. The abdominal opening is closed and the vagina is packed with iodoform gauze.

For atresia of the vagina, Crede, in 1883, was the first to use the skin over one of the labia majora; similar procedures were devised from the mucous surface by Mackenrodt, Abbe, Noble, Baldwin, and others. Baldwin resected the intestine (sigmoid) and brought the isolated loop down between the bladder and rectum for a vagina. Bovee did a similar operation, utilizing the rectum for a vagina, and stitched the sigmoid flexure to the anus to take the place of the rectum, but he does not recommend it. (Bovée, *Practice of Gynecology.*)

A silver plug was used by Sims to keep the passage open, and Pozzi obtained temporary success by electrolysis. "If there is absence of the vagina, or non-development of the uterus so that menstruation does not occur, it is usually undesirable to make a vagina simply to permit copulation. (Hirst, *Diseases of Women*, 1903.) Gillian mentions a case of atresia of the vagina successfully treated by operation. Kelly says, "An operation attempting to establish a connection between rudimentary organs and the vulva cannot be serviceable and is therefore unjustifiable. It is also useless to attempt to form a deep pocket between the rectum and the bladder simply for sexual purposes; such an opening cannot be maintained."

J. F. Baldwin, Columbus, O. (*Jour. Amer. Med. Assoc.*, April 23, 1909), reports a case of congenital absence of the vagina in a girl, aged eighteen years, in which he employed his method of restoration of the passage by the transplantation of a portion of the ileum, carefully preserving the mesentery. Recovery was uneventful and the result successful. He has operated on four such cases. Drs. Mueller and Mori each reported one smilar successful case.

Baldwin's Operation. The patient was placed in the lithotomy position and a transverse incision made in the perineum at a point corresponding to the normal opening in the vagina. Index finger in the rectum and sound in the bladder he carried the dissection forward until the peri-

toneum was reached. The opening was made amply large, and tightly packed with gauze pressed in around a large hemostat, which was introduced to facilitate the second step in the operation. The patient was then placed in a horizontal position, and the abdomen opened on the median line. Not a trace of a uterus could be found. (In two other cases of congenital absence of a vagina, he found the uterus represented by a small piece of tissue, about the size of the end of the little finger, on each side, close to the ovaries.) In this case the ovaries were normal, but much higher up than usual. The field of operation was protected with gauze sponges. The lower end of the ileum was brought up, the intestinal contents displaced about 12 inches, and this portion of the bowel resected, with a careful preservation of the mesentery. The ends of the resected section of the bowel were inverted with purse string suture, and the other ends connected with a Murphy button so as to reëstablish the continuity of the canal. He left just enough of the lower end of the ileum attached to the colon to enable him to make this anastomosis. The peritoneum over the vagina was then opened, exposing the hemostat, which was then pushed into the pelvis by an assistant. The detached bowel was then caught at its middle by the hemostat, and drawn close into the artificial vagina. The peritoneum was carefully brought together over and around the ends of the piece of bowel, making a smooth floor. The abdomen was then closed in layers in the usual way.

The patient again placed in the lithotomy position, the bowel was opened where it had been caught by the hemostat, each leg of the loop wiped out, and then packed with iodoform gauze tightly enough to pack closely against the walls of the artificial opening. The edges of the opening into the bowel were caught to the edge of the new vulva, and a small drainage inserted at the bottom to take care of any oozing which might occur.

Baldwin examined the ileum and sigmoid in several

hundred patients when making ordinary abdominal operations, and found in all that there would be no difficulty in drawing down such a loop of ileum into the vagina, or a loop of sigmoid, if the ileum should not be found satisfactory. With either there would be sufficient slack of the mesentary not to interfere with the circulation. He prefers to use a loop of ileum, considering it safer than resection of the sigmoid.

In all his cases the operative recovery was absolutely smooth. He was induced to use the bowels for this purpose after extensive study of the literature of artificial vagina, which he considers shows that in entire absence all other methods resulted in "almost complete failure," although full of promise when the patient left the operating table. "By the use of the bowel a normal mucous membrane is provided, surrounded by normal connective and muscular tissue, and with ample blood supply."

In addition to Baldwin's 4 successful cases we have a successful operation reported by Mueller (*Jour. Amer. Med. Assoc.*, January 29, 1910) and one by Mori (*Ibid.*, February 12, 1910).

Baldwin claims that his operation preceded that of Mueller and Mori by several years.

In the issue of the *Münchener medizinische Wochenshrift*, of the date of December 21, 1909, Dr. Mueller describes the following case:

Operated by Prince Ludwig Ferdinand of Bavaria. The patient was a young woman about to be married. She had no trace of a vagina, nor had she ever had any sign of menstruation. Otherwise she was healthy. The surgeon decided to make an artificial vagina and proceeded as follows: A loop of the small intestine that could be brought down to the vulva was resected for about six inches; the cut-out piece was wrapped in gauze and the stumps united with an end to end suture. The resected piece with its attached mesentery was then brought down through the peritoneum

between the rectum and the bladder, the lower end of the strip covered with gauze the upper end closed with three tier suture. The lower end of the intestine was fastened to the lips of the wound in the vulva by means of five catgut sutures. The operation was a difficult one, requiring two hours and twenty minutes and was done under scopolamine, morphine, chloroform, and ether.

The weakness of the pulse required the infusion of saline solution. The operation was a perfect success, the patient's recovery was uninterrupted, and she now has a serviceable vagina.

Samuel Gache (*Annals of Surgery*, 1891, p. 223). The patient was a young girl, aged sixteen years, who had never menstruated. Examination found no trace of a vagina—uterus rudimentary and about the size of a hazel nut. The tubes and ovaries were of normal size.

Operation. A transverse incision was made into the membrane, occluding the space between the labia and rectum, and bladder separated by finger in the rectum and silver sound in the bladder. After penetrating to a depth of seven centimeters the newly made vagina was lined by cutaneous flaps from the perineum and one formed by mucous membrane from the labia minora and base of the labia majora; fixed by sutures and the vagina packed with iodoform gauze; while the bowels were constipated by opium for a few days.

The flaps healed by first intention and in six days union was complete. The new vagina measured seven centimeters and was well lined its entire extent. To prevent contraction, it was packed twice daily with iodoform gauze and two weeks after the operation digital dilatation was done every three days. One month after operation the patient left the hospital in good health, with a vagina that measured seven centimeters in length, permitting the introduction of the entire index finger.

McMordie (*Annals of Surgery*, 1889, p. 149) records a

case of a woman, aged twenty-five years, unmarried, who first menstruated at sixteen, but not more than seven times in all. The vagina was found to be very small and the hymen intact. The finger of one hand in the vagina found hardened feces at upper part, close to the cervix uteri. A finger of the other hand in the rectum passed through an opening into the vaginal septum and met the other finger in the vagina. The opening was about the size of a sixpence or a dime, and was about an inch from the anus. The edges were freey pared toward the vagina and were brought together with silver wire. The patient was discharged in three weeks and union was perfect.

LITERATURE: Abbe, Bovée, Crede, Gache, Gillian, Hirst, Kelly, Noble, Mackenrodt, McMordie.

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DISCUSSION

Dr. Reuben Peterson, of Ann Arbor.—When I received a preliminary program of this meeting and looked it over, I was much pleased to see that Dr. Ferguson was going to present this paper.

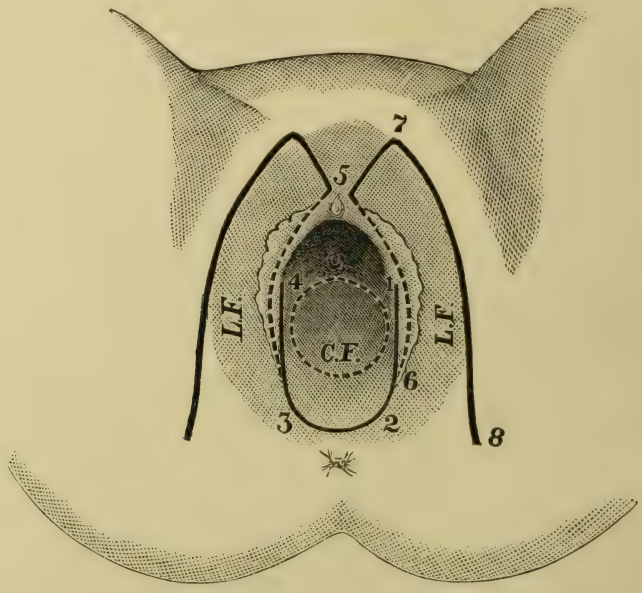
Some two months ago I had a patient who presented herself with a complete absence of the vagina. She was aged about fifteen years, and had begun to menstruate, but of course there was no way for the blood to escape. An operation had been attempted, and a cut had been made in this region here (indicating on the blackboard), but the surgeon unfortunately had gotten into the rectum. The fistula, however, had healed up. I thought it would be better to open the abdomen, so that I could find out the position of the uterus and the shape of it. The uterus was dilated by the menstrual blood, as was also the upper portion of the vagina. From this point down there was complete absence of the vagina. After the abdomen was opened, I had my assistant push down the fluctuating tumor, while I made an incision in the perineum. By careful dissection from below, I finally reached the fluctuating tumor, which was about two inches from the outside, and incised it. Now comes the question of making an artificial vagina, and knowing Dr. Ferguson's skill in this particular line of surgery, I have had the little girl wait in the hospital until I could see these cuts. Of course, in this particular patient it is highly undesirable to remove the uterus, the tubes, or ovaries. She is only fifteen years of age, and there is no reason why plastic surgery should not be employed in her case, so that the vagina can be made patulous, and the uterus functionate.

Dr. George H. Noble, of Atlanta.—The technique described by the essayist is practically the same I have been using for several years. This I will show you by the sketches on the blackboard.

Formerly it was my practice to divide this work into two operations, the second one consisting in cutting off pedicles of flaps taken either from the labia, thighs, or other external parts. For several years I have been doing the operation at one sitting, following the general principles I will show you.

In the congenitally absent vagina and the acquired atresia closing the vaginal orifice, I make a central or anterior flap outlined by a U-shaped incision, commencing at the level of the meatus, and at a point close to the inner side of the labium minorum (1) extending downward, following closely along the base of the labium minorum on the inner side of the perineum (1 to 2), and curving across it just in front of the anus and extend-

ing to the opposite side (2 to 3); from this point it turns upward following the inner side of the opposite labium minorum to a point that corresponds exactly to the starting place (3 to 4). This flap is dissected upward, taking the skin from the perineum and the mucous membrane from over the site of the vaginal orifice up to the urethra. When free it is held upward, and the bladder is then separated from the rectum. In making this dissection the finger should penetrate the fatty tissue on one side between the rectum and vagina, then extend upward to the peritoneum, and at this point turn across to the opposite side, passing between the rectum and bladder in the extraperi-



toneal fatty tissue. The entire attachment between the rectum and vagina can then be hooked down by the finger and brought into the vaginal orifice. The index finger of the other hand then penetrates the opposite side between the rectum and vagina and passes up to the tip of the finger previously introduced. This will enable one to turn out the vesicorectal attachments and separate them under the eye. The next step consists in outlining the two flaps on the labia majora. The incision is made from the clitoris downward, following the outer side of the labium minorum close to its base until it joins the raw surface made by dissecting the central flap (5 to 6). An incision is made from the clitoris upward and outward at an angle of about 40

to 45 degrees to the mucocutaneous junction (5 to 7), then downward along the mucocutaneous line to the perineum (7 to 3). From this point the line should curve gradually outward. A similar flap is outlined on the opposite side. They are dissected off to the fullest extent and later sutured in place. The central flap is used to cover the anterior surface of the vagina. The other two are applied to the lateral walls and all of them fastened in place with catgut sutures. To prevent folding upon themselves and constriction of vagina, the parts are separated by the use of a small rubber bag or condum. The latter, if used, is slipped over an old-fashioned Ferguson cylindrical speculum and passed high up in the vagina. The rubber bag is then distended by packing strips of gauze through the speculum into it. The packing should not be tight; only pressure enough to keep the flaps in position should be used.

The raw surfaces are closed by loosening the edges of the wounds and suturing the margins together with silkworm gut. The pedicles of the flaps taken from the labia majora will meet in the median line between the anus and the posterior commissure, and no raw surface is left at any point.

The operation is extremely satisfactory, and makes a vagina of ample dimensions. The only place that is liable to contraction or requires watching on account of cicatrization is the posterior wall, for the anterior and lateral walls are protected by flaps. Cicatrization can be controlled and the granulations flattened by the continuous use of the rubber bag.

I have not met with the difficulty mentioned by Dr. Ferguson—spasm of the levator ani muscle. I presume it is because I have not used the hard dilator, which I think is the cause of the spasm, and I feel sure that if he will adopt the use of the rubber bag as here described he will not again be troubled with vaginismus.

Dr. Kelly will remember my describing this operation to him when he was a guest at my house two years ago, and will probably recall the cases I reported to him at that time.

Dr. Rufus B. Hall, of Concinnati.—I would like to ask Dr. Noble what is the appearance of the inside of the vagina he has constructed at the end of two or three months? Has it the appearance of mucous membrane where you turn in the skin flap?

Dr. Noble.—It looks very much like mucous membrane, but does not appear perfectly normal. It represents mucous membrane about as much as mucous membrane represents skin when turned on the outside.

Dr. M. C. McGannon, of Nashville.—My chief reason for trespassing upon your time is to tell you the results I have had from some of this work.

Some six years ago it was my good fortune to come in contact with this kind of case. The patient had this condition: the uterus was so (indicating on blackboard); and that was the extent of the vagina (indicating). The vagina, however, opened into the urethra, so that menstruation took place through the urethra, and this woman did not know until after she had been married that she had any deformity. Subsequent to her marriage the deformity was ascertained, and she applied to a doctor, who, upon examination, found a small opening, with a well-marked hymen seemingly present. The vagina was closed at the time, and the bladder emptied into the vagina. He kept it open, he dilated it, so that subsequent to that there was no difficulty in having sexual intercourse, but unfortunately this woman was no longer able to control her urine. When she came under my observation, I found the condition I have depicted here on the blackboard. I decided I would have two things to do, to close the opening in the urethra, and make a new urethra and a new vagina. Instead of making a flap backward and bringing it forward, I did this: this represents the anus (indicating); I dissected off a flap from this point here (indicating), so that I could have skin for making a new vagina. I carried skin as a flap from that point back to the anus deep into the vagina, and attached it to the small portion of the mucous membrane represented in this drawing. I used the labia minora on either side, and found it sufficient to make the balance of the vagina. She has come under my observation frequently since. A year and a half ago, subsequent to the operation, she came to consult me because she was pregnant, and upon examination I was unable really to determine or to recognize any difference between the skin I had turned in and normal mucous membrane which we ordinarily find. It was smooth and to all intents and purposes mucous membrane. That woman has since been delivered; it was a forceps delivery, and the child was born dead. Since that time she has had another child, and apparently she is in perfect condition. She had no great difficulty in her subsequent delivery, and she has to all intents and purposes a perfect vagina so far as one can see. It serves its purpose completely. It is a little deformed. It has not got the labia minora Dr. Noble referred to. But that deformity is really a thing she can bear with.

I had another case of a similar nature five years ago, the woman having been operated upon in New York, and the gentleman who did the operation unfortunately got into the bladder, so that a vesical fistula resulted. When she came under my observation I undertook to make a new vagina for her before she was married. The external appearance of that woman was perfect, but there was nothing in the way of a vagina except

this little opening—which would not permit the entrance of the organ—that resulted from the previous operation. I undertook to make a new vagina by taking a flap of skin back to the rectum and using the labia minora on either side; I carried the structures well up; I did not cut either of the levator ani on either side. I used a glass plug in order to keep the vagina wide open until healing had been complete. I used a large and long plug, and kept it in there until the woman was well. This woman had a keen sexual desire, and she and her husband said that everything was satisfactory subsequent to the operation. I presume it was because she became enamored of a young man and left her husband, and since they have been divorced everything is going on satisfactorily.

Dr. Ferguson (closing).—As I stated in my paper, I was not introducing anything new, and I want to give Dr. Noble full credit for being a pioneer in this work, and also to Dr. Baldwin of Columbus, Ohio, for being the first surgeon to use bowel for an artificial vagina.

A POSITION FOR SAVING TIME AND FACILITATING COMBINED ABDOMINAL AND PELVIC OUTLET OPERATIONS

By A. C. Scott, M.D.
Temple, Texas.

Among the elements which enter into the problems effecting the general results of surgical operations, the one which stands preëminently above others is "time." That this fact is not known, or is wholly unappreciated, is evidenced by the slow, tedious, time-killing methods used by many surgeons, and the utter disregard of time often exhibited during the progress of surgical work. This is perhaps more noticeable in the practice of those who have little experience or untrained assistants. It is occasionally observed in the work of some surgeons who have had very wide experience extended over a period of many years, but who are naturally slow and have not calculated the added risk from anesthesia, shock, loss of resistive power, etc., sufficient to overcome such a natural tendency. We can criticise the natural tendency of the slow, poky surgeon with great freedom, for the writer was once upon a time "the greatest sinner of them all," and it was only after many surprises and sad experiences that he awoke to a proper realization of his errors and made unceasing efforts before he could lay any claim to being placed in another class.

When we speak of time saving, we do not wish to lead one to infer that we would approve slighting the work in any respect, or actually getting in a hurry, for neither prove in the end to be good substitutes for careful, deliberate

technique. It should be remembered that one may be careful and deliberate without wasting time, and it is wasted time that is so unprofitable and often harmful to the patient's interests. Every minute of useless anesthesia, every minute of useless exposure of the intestines or open wound at any other point, constitutes an additional element of risk to the patient's life, which may be indicated by lowered resistive power, vomiting, shock, suppression of the urine, pneumonia, sepsis, intestinal paresis, etc.

For many years, the writer and his associate, Dr. R. R. White, have given much thought to this feature of surgical technique, and have found many little details which contributed to the economy of time. It is one of these small details which we have thought proper to present to you today.

Before describing the position referred to in the caption we will attempt to show in a measure its necessity by a brief discussion of the two most common and useful positions for surgical work.

Trendelenburg Position. In work about the abdomen and pelvis, the modern surgeon can scarcely estimate the value of the Trendelenburg position, which is obtained by allowing the knees to flex at a right angle over the padded edge of the table, which is then elevated at an angle of about 45 degrees. While in this position (Fig. 1) it will be noticed that the thighs are parallel and close together, and the perineum is some twelve to eighteen inches from the edge of the table, according to the length of the patient's thighs—a position in which it is impossible to do any work about the pelvic outlet.

Dorsal Position. A most useful position for work about the vulva, vagina, perineum, and rectum is the dorsal position, which is usually obtained by swinging the feet in upright stirrups, or hanging the knees over knee-holders supported by upright bars, fastened at the corners of the table. In this position, the perineum is brought over the

edge of the table so a self-retaining or Sims speculum may be used. The thighs are flexed to or beyond a right angle to the body. The surface of the table is horizontal, or nearly so, and if elevated to a marked degree the patient may slide back from the edge. While in this position, the flexion of the thighs renders work within the abdomen very difficult or impractical altogether.

From a consideration of the above facts it is to be noted that it is not ordinarily feasible for operative work in the abdomen and pelvic outlet to proceed at the same time; hence, in the numerous instances when patients require operative work both in the abdomen and pelvic outlet, *one operation must be finished before the other is begun*, and usually the change of position requires considerable time and creates confusion on account of disarrangement of sterile sheets and towels which may come in contact with some unsterile part during the change.

A Position for Combined Operations. By use of any metal knee-holder which fits comfortably in the popliteal space (we use Behrhoffs') one may secure exposure of the abdomen in an elevated position, and, at the same time, exposure of the pelvic outlet, making possible the use of self-retaining speculums, if desired, and permitting combined or multiple operations to be made simultaneously through the abdomen and pelvic outlet (Figs. 2 and 3). This is accomplished by having the popliteal knee-holder (Figs. 4 and 5) hinged on a short upright bar (*c*), which is broadened and slotted at the lower end to slide with a set screw upon a horizontal bar (*a*), which in turn is fixed to a strong cylindrical upright bar (*b*), sliding in a vice-like clasp at the side of the operating table. The sliding upon the horizontal bar allows adjustment for the varying lengths of patient's thighs. The cylindrical upright bar (*b*) at the side of the table, by sliding up or down, permits the thighs to be moderately flexed or fully extended, and, by rotating, permits abduction or adduction at will.

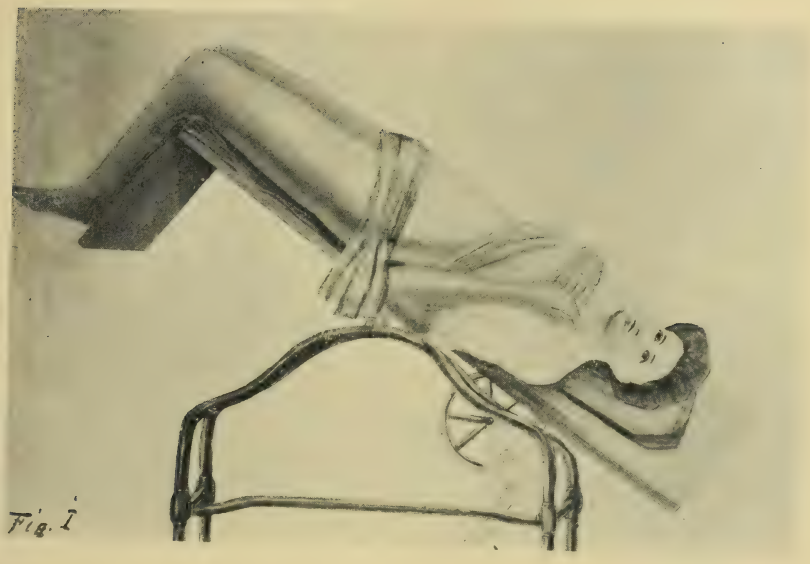


FIG. 1

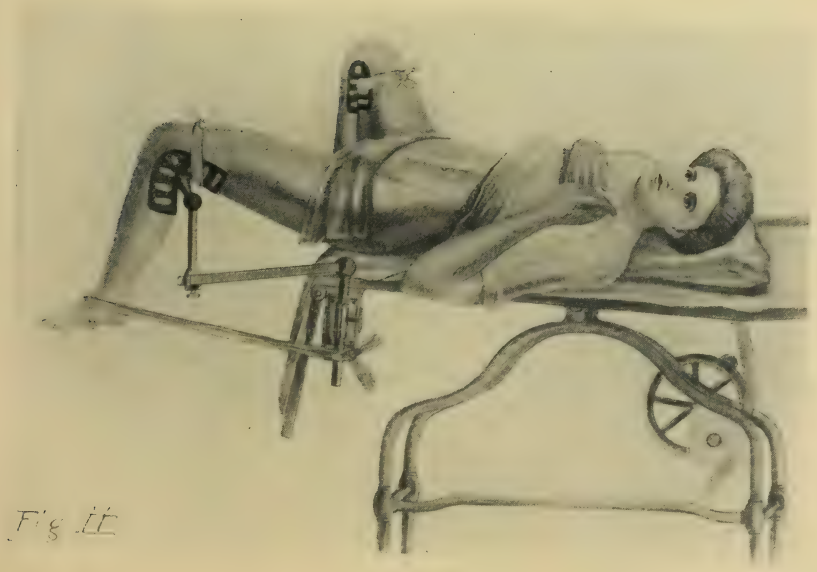


FIG. 2

FIG. 3

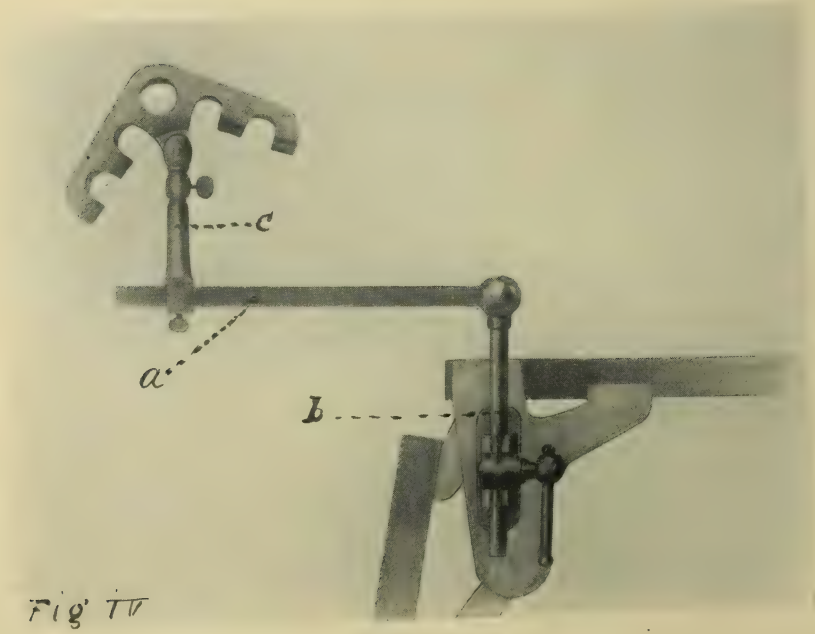


FIG. 4

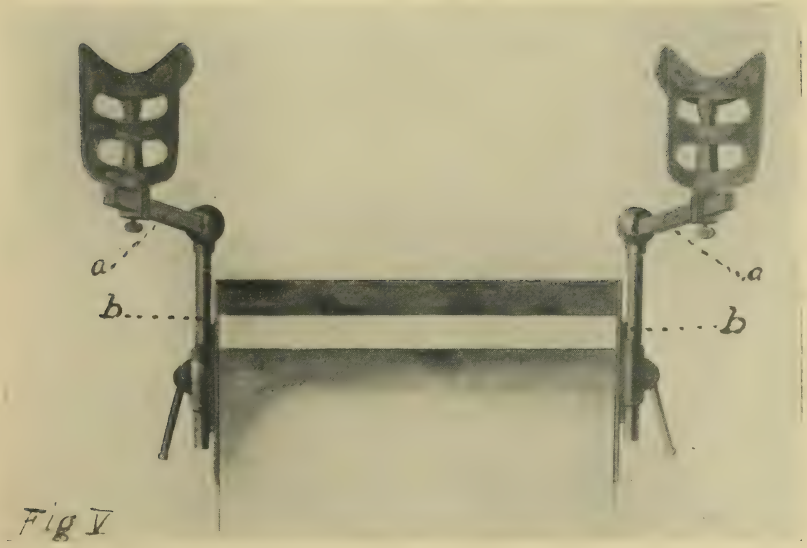


Fig. 5

Before starting the anesthetic, the patient's hips are brought beyond the edge of the table and the limbs placed upon the knee-holders. A piece of bandage loosely wound about each ankle is tied to a convenient point below the corner of the movable part of the table to prevent extension of the limbs, another is placed above each knee to prevent elevation of the knees, thus securely holding them in their respective knee-holders. Any modern operating table will serve the purpose for these attachments and enable one to secure the desired combined position, if it has a pivotal point about the centre permitting the entire surface of the table to be raised or lowered at will. We use a modification of the Markoe table, which operates with wheel and rachet and can be changed by the anesthetist with perfect ease.

After the patient is in position and the anesthetic is begun, the foot of the table is lowered about five or six inches for convenience of completing the preparation when thorough rinsing of the abdomen and vagina is practiced. This is done and the table returned to the horizontal plane without again having to take hold of the patient with the hands.

When it is anticipated that the abdominal work may be at all difficult or complicated, it is usually begun first and carried beyond the difficult point before the pelvic work is begun. If, on the other hand, the case requires shortening of the round ligaments and colporraphy or amputation of the cervix, it is better for the cervix work to be completed first, in which case neither operator on these parts nor his assistants take any part in the abdominal work without change of gown and gloves. To prevent possible contamination of the abdominal wound from the pelvic outlet, a towel is loosely folded across the pubis and upper part of the vulva and pinned to the skin with a sterile safety pin to securely hold it in place. Of course, instruments, sponges, etc., for the pelvic outlet work are kept on a separate table from all

others and are not handled by the nurses taking part in the abdominal work.

In a large number of cases, it is entirely practicable for two operators, or an operator and trained assistant, to work on separate parts, beginning at the same time and finishing at approximately the same time, thus reducing the time required 50 per cent.; for instance, the operator working through the abdominal wound may remove a diseased appendix, fallopian tubes, etc., while the other dilates the cervix, curettes the uterus and removes hemorrhoids, or, while one removes an uncomplicated tumor or shortens the round ligaments, the other may do a curettement and perineorraphy. In hysterectomies for uterine carcinoma, one may sterilize the cervix with the actual cautery and close it by suturing, then apply Pryor's clamps to the uterine arteries, while the other ligates the ovarian vessels and round ligaments and separates the bladder from the uterus, incidentally guiding from above the application of the clamps from below. In cases of diffused peritonitis in women, it is very desirable to drain through both the abdominal wound and Douglas' pouch, and finish the work quickly. With a patient in this position, without elevation, this work is greatly facilitated and the time required is very short indeed. Many times during difficult operations through the abdominal route, good retraction is of extreme importance. The assistant standing by the operator's side cannot see to advantage and gets in the operator's way to an annoying degree. With the patient in this position, the second assistant stands between the widely abducted thighs close up where he can see well, standing upon a stool, if necessary, and makes retraction both right and left with facility, and, if necessary, may sponge and ligate with advantage equal to the first assistant.

Summary. The position here described possesses the following advantages:

1. Where two operators are working together with plenty of assistants at their command, the time required for many

combined or multiple operations may be reduced to a marked degree and often as much as 50 per cent.

2. The final preparation of rinsing both the abdomen and the vagina is easily accomplished while the anesthetic is being given without having to lift or disturb the patient again.

3. By use of a folded towel pinned to the pubis, with other protective towels or sheets placed about the field, the surgeon may change from one field of operation to the other without any disarrangement or risk of contamination of these articles.

4. By changing the axis of the table, the pelvis and abdomen may be lowered, if desired, or elevated, to secure the advantages of the Trendelenburg position at any stage of the abdominal operation, without interfering with work simultaneously being done upon or through the pelvic outlet.

5. All the advantages of the Trendelenburg position may be obtained without its disadvantages.

6. All the advantages of the dorsal position for pelvic outlet work are obtained without flexing the thighs upon the abdomen or otherwise interfering with work required through the abdominal wall.

7. By wide abduction of the extended thighs during abdominal operations, room is made for a second assistant to stand with advantage for sponging, ligating and retracting, equal to the one standing directly across the table from the operator.

DISCUSSION

Dr. J. Wesley Bovée, of Washington, D. C.—There are some points about this paper that I think are worthy of our commendation. I am glad to see that Dr. Scott looks into the details and tries to lose as little time as possible during an operation; yet it seems to me that the time has not yet arrived in pelvic surgery when we can take up this cotemporaneous syndicate operation, and I think also that he does not do away with all the troubles of the Trendelenburg position. He does not do away,

for instance, with the loss of urinary excretion, which varies between 50 and 90 per cent., while the patient is in the Trendelenburg position, and which is no small element or item of danger.

There are some other points that I should like to lay stress on, and one in particular, namely, the advantage of cleaning the vagina and vulva with these douches. While he uses iodine on the abdomen, he does not apparently use it in the vagina or vulva, and if he has any objection to its use on the vagina or vulva I wish he would so express himself when he closes the discussion. I use iodine in the vagina and on the vulva and perineum and abdomen, putting it on at the same time. If we can trust iodine upon the abdomen, we can trust it in the vagina. The doctor wants to establish drainage through the cul-de-sac of Douglas by working from below upward, and I understand that he changes the instruments during the operation. I do not see why a different instrument should be used for vaginal work from what we use when working through the abdomen. If we have a sterile field there is no necessity for a change. I make no change in my practice. If I want to establish vaginal gauze drainage, or any drainage through the cul-de-sac of Douglas and vagina, having the abdomen open, I do not enter the vagina to make that opening, but do it from above. It is easy enough to make a hole through the cul-de-sac of Douglas from above, take an ordinary uterine sound, and push the end of the gauze strip out through the vagina from above; you will thus save more time than working in both directions. I throw out these hints in the way of expedition and in saving time.

Dr. Alexander Hugh Ferguson, of Chicago.—The paper just read by Dr. Scott is laudable. The position of the patient on the operating table here recommended facilitates rapid and efficient work in the pelvis.

Dr. Scott (closing).—From the way this discussion has proceeded, I am very glad there is no more. I am thankful to those who have been using this combined method for a number of years, and wish to give credit to those who have preceded me for a good long time. We have been making use of something of this kind for two years, and, in fact, the first time that I had something arranged for a position of this kind, I did not appreciate how valuable it was going to be. I thought it would be of some real value in exceptional instances, but since making use of it during the last two years, particularly during the last six months, we have found it very useful and advantageous. We have used it in the last six months in less than a hundred cases.

So far as Dr. Bovée's remarks are concerned about combined operators getting together on things of this kind, the idea has

occurred to me that the majority of operators who do a great deal of work have some one assistant who can do just as good work as they can, if not better, and when they delegate to the first assistant the least important part of the operation, we know in a large number of instances they will do better work and quicker work, and when they think they do quicker work, they gain something, provided they have not slighted anything in so doing.

With reference to using iodine in the vagina, there are two objections to it, one being that, in the first place, it is not likely to be so effective as it is upon the skin, because you cannot get the vagina so dry. I think most of those who are using iodine today insist that the skin must not be moistened with the iodine when the iodine is used, and it is not very practical to get the vagina so dry, and it is probable that the vagina cannot be made dry enough to make the iodine as efficient as when it is used on the skin. Furthermore, I think iodine, when used freely in the vagina and about the vulva, leaves the patient in a short operation with a very annoying, burning sensation. I do not mean its use in the vagina so much as I do about the vulva. Some patients complain of it where I have used it on the vulva.

THE TREATMENT OF ANTEFLEXION OF THE UTERUS

By Henry T. Byford, M.D.
Chicago, Illinois.

I have nothing new to offer in the treatment of anteflexion of the uterus, except not to offer anything new. The great and original Solomon knew of nothing new. In surgery most of the new things are nuisances because it takes so much writing of papers and mutilation of patients to demonstrate that the new usually eventuates in nothing, and should not be written about.

My experience with anteflexion is that somehow or other we have always been able to relieve our patients. Yet judging from the new things that have been advocated from decade to decade, one would infer that up to the present time, or at least up to the last new thing that is offered for trial, the real thing had not been discovered. It is "off with the old and on with the new." There are many great operators, yet few great surgeons. The fact is that those who make real advances in surgery, as in other arts, do not look into the future, but into the past. They take the good they find in old things and adapt it to the needs of the present, and thus advance our knowledge by giving us not something new, but only the appearance of something new. But I am not going to offer even the appearance of something new. I am content, with Solomon, not to pretend to know anything new.

Instead, therefore, of looking toward the future, which, until it comes, can have nothing reliable to teach us, let us review what the past has taught us. In mild cases of anteflexion with dysmenorrhea and sterility a few moderate dilatations by the sound have been followed by pregnancy and cure. In other cases divulsion and temporary packing of the cervix have sufficed. But we have not infrequently met with those in which congenital and developmental deficiencies were such that these methods only temporarily relieved the dysmenorrhea, and the sterility not at all. In some of them the monthly crises have led to hyperplasia of the uterus and ovaries and chronic invalidism and, last but not least, to a loss of the ovaries by operation. The uterine body is apt to be well developed, or to become so as the result of the excessive monthly hyperemia connected with its distention by the menstrual fluid and its efforts at expulsion; but in the cases we are speaking of the uterine ligaments remain short, the cervix and vaginal fornices poorly developed, and more or less pressure atrophy of the anterior cervical wall takes place.

A few dilatations with sounds, or a divulsion and packing, unless followed by pregnancy, cannot rectify these last-mentioned conditions. Discission of the cervix, whether by the Simpson or Sims methods or by the Dudley or Pozzi modifications, does not. These operations often cure the dysmenorrhea and establish uterine drainage, but they mutilate and tend to throw the cervix out of function and thus favor atrophy rather than development. The relief from suffering is frequently, although not always, immediate, yet in quite a proportion of cases is not permanent. When it is permanent the mutilation is apt to be such that the uterus cannot retain the fecundated ovum. In short such operations benefit the surgeon rather than the patient or posterity.

What is lacking in all of these procedures is the development of the cervix and vaginal vaults. The uterine cavity

is not even made straight; its lower or cervical portion is destroyed and thus a portion of the curve eliminated. But anteflexion is normal, and the cavity of the uterus does not have to be made straight. The entire uterine cavity can be made large enough to allow of a normal outflow of the secretions without destroying the lower or cervical portion. Such a condition we sometimes observe in multiparæ with extreme anteflexion. And just as we can obtain this result temporarily by an adequate dilatation, so we can secure it permanently by keeping the cavity adequately dilated. But there is only one way of keeping it dilated, and that is by developing the cervix. Pregnancy does this and takes months to do it. We can also do it, but we must also take months, many months. Goodell tried to do it by the extent of the dilatation. Gill Wylie succeeded by a persistent use of a stem after the divulsion, and Davenport still uses the stem method quite successfully. The Outerbridge stem has, I think, been successfully used, but it is not a safe instrument. Vuillet kept the uterus packed with cotton balls for variable lengths of time with success. Experience and reason has taught us that almost any foreign body that cannot be accommodated in the uterine cavity without some enlargement or stretching of that cavity, will, if kept in it, cause some development of the uterus and its cavity in size. If the foreign body project down into the cervical cavity, it will act similarly on the cervix. But any foreign body left in the uterus is liable to cause abrasions and infection, and, with the supervision that can ordinarily be given, invites disaster.

Since none of these methods has found general favor, and it is no longer considered an evidence of fogyism not to perform a radical operation, I will venture to present the claims of the method I have always employed. It consists in introducing a body large enough to overdilate the cervix, and often enough to keep it overdilated. I have treated puerile cervices on this principle, and feel that I am very far within

bounds in saying that, if we can keep the entire cervix dilated sufficiently for the passage through it of a No. 20 (American scale) male urethral sound from one to two years, the cervix will then continue to functionate normally. And this treatment is not so strenuous and tedious as the words "two years" would suggest.

Without taking up your time by the recital of individual cases, I will say, in a general way, that I have sometimes commenced by dilating bi-weekly with a small block-tin sound, and have progressively dilated to about the size indicated. I have then maintained it by means of weekly dilatations for a time, then of bi-monthly, then monthly, until the year was up. As a rule, I have had them come back in six months or a year for a few weekly dilatations in order to be sure of permanency of results. In most cases I have preferred beginning with divulsion under general anesthesia, and have then prevented contraction by the periodical passage of the sound. But the important and indispensable part of the treatment is its continuance for many months. In the event of a return of the dysmenorrhea, a few bi-weekly dilatations followed by a few monthly ones usually suffice to render the cure permanent.

The greatest objection to the treatment is that it is painful. I reduce this objection somewhat by passing the sound frequently at first, *i. e.*, by not giving the cervix time to contract too firmly between times. As the tendency to rapid, firm contraction diminishes, the dilatations can be made at longer intervals without increase of pain. I like, however, to dilate as widely each time as the patient will tolerate, because the greater each dilatation and stimulation the greater the effect upon development. As I have already said, the tedium of the treatment is not as great as one might suppose, because, after the dilatations are a month apart, they occupy but little of the patient's time and attention, and can then be continued as long as desirable. The temporary pain of one or two a month is more easily

and willingly borne than the monthly dysmenorrhea, the more so as she knows that they will soon become less frequent. The pain ceases the moment the sound is withdrawn, and the patient may go out from the office to do her shopping.

With regard to the technique: The patient takes a copious normal salt douche before leaving home for the office. After the introduction and adjustment of a sterile bivalve speculum, the vaginal fornices and cervix are swabbed out thoroughly with a 5 per cent. solution of carbolic acid, and the sound, after having been curved to suit the case, is dipped into the same solution immediately before being passed. Sometimes it is necessary to steady the cervix with vulsellum forceps, but the vaginal fornices are often so small that the expanded speculum puts them on the stretch and keeps the cervix from receding too far. The stretching of the poorly developed vaginal fornices is an advantage rather than a disadvantage. Before removing the speculum I disinfect the uterine cavity and introduce a dry sterile wool tampon under the cervix and leave the latter for twelve or twenty-four hours for its dilating effect upon the vaginal fornices. The patient withdraws it by means of an attached thread and uses a copious normal salt vaginal douche.

I have thought it worth while to go into the details of this old well-known treatment for the following reasons:

1. I know of no book or monograph in which its efficacy is given proper appreciation.

2. I know of none in which the necessity of such persistence in overdilatation is sufficiently emphasized.

3. I know of no method that will give better results if persisted in to the extent I have recommended.

4. I know of no cure that is as safe in the hands of the average practitioner.

5. I know of no book in which a sufficiently definite detailed technique is given.

6. The cutting methods are all objectionable and irrational in cases of arrested development.

I might add that, in patients who are hyperesthetic or intolerant of pain, this treatment can be combined with other treatment. For instance, if the patient will not allow the same sized sound to be passed each time, and the cervix gradually contracts, divulsion under anesthesia can be performed two or three or four times at intervals of two or three or four months and the dilatation be kept approximately at the same degree by the sound between times.

DISCUSSION

Dr. Ernst Jonas, of St. Louis.—In strictures of the urethra and rectum I have used in combination with the dilatation treatment, advocated by Dr. Byford, the injection of a solution of fibrolysin. I would like to ask Dr. Byford if he has had any personal experience with fibrolysin. The mechanical dilatation, combined with injection of fibrolysin seems to be of advantage.

Dr. Hubert A. Royster, of Raleigh.—Those who remember the paper Dr. Byford read before this Association a few years ago on dysmenorrhea will not be surprised to know that naturally he has followed up that by this paper. In his former paper he deprecated the treatment of the nasal mucous membrane for dysmenorrhea, and stated that the nose had three functions, namely, that of blowing, that of smelling, and that of menstruating. And he developed one of the strongest arguments against such silly nonsense as was going around at that time, simply because he knew how to use ridicule with great effect. Now he has come back to us with a serious paper, and one which I commend, because if he has proved one thing which we have all got to recognize, it is that the older physicians now dead treated anteflexion dysmenorrhea as well as we do at the present time. Whether we say it is due to obstruction, to endometritis, or to an undeveloped uterus, or what not, we have got to go back where we started. There is nothing new except what has been forgotten. In cases of anteflexion of the uterus we must be sure that it is the cause of the dysmenorrhea, for there are a great many women who have anteflexed uteri and have no dysmenorrhea. There are other women who have a tremendous lot of dysnemorrhea of a patricular type without anteflexion. Granted that we have such a condition, we have the recourse open to us, and Dr. Byford has presented it. Personally, I have been all over these measures. I have done simple divulsion under anesthesia, with nothing else. I have resorted to slight

dilatation; I have done the Sims and the Dudley operations. I have done the recent Pozzi operation, and have been disappointed with all of them in the particular mentioned. In the latter operation, while you help to cure the dysmenorrhea, you do not relieve the sterility in the majority of cases.

I have done 10 Pozzi operations, 6 of them having been performed on married women; and not one of the women has become pregnant, although 75 per cent. of them have been relieved of the dysmenorrhea.

In a recent article by Beyea, he takes up the theoretical ideas of Schulte, who says dysmenorrhea is due not to a bend in the cervix, not to endometritis, not to stenosis, but whips around the stump by saying it is due to circulatory changes in the cervix. To bring about growth of the uterus, to develop the cervix, to remove the circulatory changes, we must do something along the line suggested by Dr. Byford. Nothing has proved of greater value to me than the rapid divulsion of the cervix under anesthesia and the insertion of a hard rubber stem pessary, which is always left in over three menstrual periods—sometimes longer. The old objections to the stem now no longer exist. They are drains and dilators rather than pessaries.

Dr. Byford (closing).—With reference to the remarks made by Dr. Jonas, I will say that the treatment I have described avoids the formation of cicatrical tissue. In cases of discission of the cervix, no matter how the operator closes in the mucous membrane, some scar tissue is liable to form. If he cuts high enough he destroys the cervical cavity, and sterility will be apt to result.

With regard to the question of whether endometritis is due to dysmenorrhea or not, I am referring to those cases with a small cervix which start with colicky pain at the menstrual period, and are perfectly well between. The menstrual pains become more severe and last longer, and in time backache and pelvic pain come between times. Then the pain in some cases becomes what is called ovarian, and the patient becomes an invalid with metritis and oöphoritis; and the question has occurred to me as to what was cause and what effect. They start with a little pain just at the beginning of the monthly period.

LARGE OVARIAN CYSTS

WITH A REPORT OF A CASE

By J. Shelton Horsley, M.D.
Richmond, Virginia.

Large ovarian cysts are rarely met with in these days of modern surgery, as they are usually removed before they attain great size. While the technique of removing them is ordinarily quite simple, ovariotomy will always have an historical interest, because it was the first operation that brought abdominal surgery into good standing. Beginning with Ephraim McDowell, it remained the most conspicuous operation in surgery until the antiseptic methods of Lister became fully established.

The literature on the etiology, pathology, course, and treatment of ovarian cysts is abundant. The large cysts are usually cystadenomas that spring from the remains of Pflüger's tubes or the Wolffian body. Cysts that arise from the Graafian follicles of the ovary do not attain large size. Like other cystadenomas, an ovarian cyst is lined with epithelium, and as there is no outlet for the products of this epithelium, the cyst gradually increases. Its growth is dependent upon the virility of the lining epithelium and is bound by no other limit. A growing ovarian cyst results in death of the host unless the cyst is removed or destroyed.

In 1900, Dr. James B. Bullitt collected from the literature up to that time (*Annals of Surgery*, vol. xxxi, p. 87) 25 cases of what he termed mammoth ovarian tumors. He included in this list only ovarian tumors weighing 100 pounds or more

and reported one weighing 245 pounds that had been operated upon by Dr. A. M. Cartledge, assisted by Dr. Bullitt. The patient succumbed on the seventh day from some form of intestinal obstruction. Of the 25 ovarian tumors reported by Bullitt, 3 were removed post mortem, which leaves 22 cases operated upon. Of these, 7 died, a mortality of 32 per cent. This indicates that removal of large ovarian cysts has a high mortality, due not so much to the difficulty of the operation as to the fact that these patients have acquired organic lesions from pressure and are poor surgical risks. In addition to this, the large raw surface often left and the removal of pressure from the abdominal viscera may cause adhesions and obstruction, or may interfere with the function of the abdominal organs to a fatal extent.

By the classification of Bullitt the following case could be included in the list of what he terms mammoth ovarian tumors.

A colored woman, L. W., was referred by Dr. A. T. Finch, of Chase City, Va. She was about thirty-three years of age, married, and had three living children, the age of the youngest being seven years. Her family and past history are of no significance. About three years ago she noticed an enlargement in the abdomen, which increased rapidly. She lost flesh and during the day her legs would swell considerably. Her bowels were regular. There was no pain; the patient suffered inconvenience solely from the weight and pressure. She was emaciated in the face and limbs. Her urine was practically normal, but showed a slight trace of albumin. There were no casts. On September 25, 1910, the patient weighed, after admission to the hospital, 222 pounds. The greatest abdominal circumference was sixty-three inches. Operation was performed on September 27, 1910. The anesthetic was ether, which had to be given with the patient lying on her left side and the cyst resting on a table beside the operating table, as she could not breathe well if lying on her back. An incision was made in the

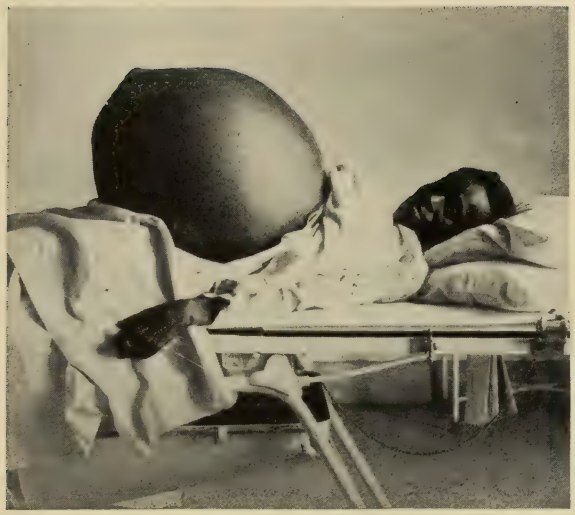


FIG. 1.—Photograph of patient with ovarian cyst weighing 116½ pounds. The patient's greatest abdominal circumference was 63 inches. The photograph was taken September 26, 1910, the day preceding the operation.

FIG. 2.—Photograph of patient six days after operation. The extremely relaxed abdominal wall and bulging of the lower part of the chest caused by upward pressure of the cyst are marked.

median line about six inches in length, beginning just below the umbilicus. The abdominal wall was extremely thin. When the peritoneal cavity was reached the cyst was found firmly adherent. It was punctured with a knife, and a large quantity of dark, chocolate-colored fluid was evacuated. The incision in the cyst was then clamped and the cyst stripped from the anterior parietal peritoneum, to which it was firmly adherent from the symphysis to the ribs. There were no adhesions to the viscera. The pedicle was found springing from the right ovary and was ligated with catgut and divided. It was small for the size of the tumor and was flattened out, being about one and one-half inches in width. The sac was removed after division of the pedicle and several gallons of hot saline were poured into the abdominal cavity. The wound was closed in the usual manner. Intravenous infusion of salt solution was started as soon as the operation was begun. The patient left the table in good condition, and when returned to bed her temperature was 98°, pulse 84, and respirations 20. About twelve hours later her temperature was 99°, pulse 90, and respirations 26. During convalescence her temperature did not go above 100°, which it reached at noon on October 2, and her pulse did not exceed 94. She suffered practically no pain, and made an uneventful recovery, there being no complication of any kind. The wound healed by first intention throughout. She was kept in the hospital longer than the average case in order that her abdominal wall might regain some of its strength. The cyst weighed 116½ pounds. On October 2, 1910, five days after operation, the patient weighed 105½ pounds.

Dr. A. T. Finch, her family physician, writes me under date of December 2, 1910, that the patient "is doing well and has been at light work for a week and is not suffering at all. The abdomen is getting smaller and she is improving in every way. She weighs now 140 pounds, she eats heartily, and does not suffer at all from any pain or trouble."

DISCUSSION

Dr. Thomas S. Cullen, of Baltimore.—I think the abdominal conformation in some of these cases after operation is very interesting. Some four and one-half years ago, I saw a patient who weighed 174 pounds. She had what was supposed to be an ovarian cyst. I operated and removed an 89-pound fibroid; the patient immediately after operation weighing 85 pounds. After the edema in the legs had disappeared, she weighed but 80½ pounds, and although a small bedsore developed, she promptly recovered. In that case after operation the ribs projected six inches, and the recti muscles lay on the bed on either side. They gradually came together, and at the present time, four and one-half years later, they are only 2 cm. apart. I might draw attention to the difficulties which the woman who made the bandage labored under. This woman would take the measurements and go back with the bandage in two days only to find that it would not fit because the conformation and contour of the abdomen had changed so much. It was necessary to refit the patient at least six times, and even then the bandage was not satisfactory.

Dr. Horsley is to be congratulated on the successful outcome in his case.

Dr. Alexander Hugh Ferguson, of Chicago.—I recollect the case of a woman with a large ovarian cyst who died within an hour after operation. I was the consultant, not the operator. I have seen a few of these old landmarks of abdominal surgery, and I have seen some of them die after operation, and, as the essayist has said, they are not good surgical risks.

I remember being called to a small town near Indianapolis to see a woman with a large abdominal cyst. She had also carcinoma of the left breast and gallstones. She was in a bad condition. I thought if I could do any good at all by stages in this woman, my opportunity had come. I began by tapping the cyst. I put a small trocar and cannula into the large cyst, and left the cannula in place for twenty-four hours. The cyst was quite watery. The next day the woman was able to eat, a thing she was not able to do for two weeks. Her heart was better. She came to Chicago, three days after, for operation, and at one seance I removed the cyst, removed the left breast, and 1127 gallstones. She recovered. I must say, however, the removal of the cyst was not as formidable as it might appear. Some of these patients die from hemorrhage into the large veins after operation, and if the fluid is allowed to come away by degrees, you will likely save the life of the patient by allowing collapse of the veins first.

Dr. E. S. Lewis, of New Orleans.—I recall two cases of very large tumors, one weighing 110 pounds, and the other 106 pounds. In these cases there were universal adhesions, and both women died from secondary hemorrhage. That is the trouble with these large cysts. The epithelium of the peritoneum is destroyed by the adhesions.

Dr. Horsley (closing).—Dr. Cullen has just called attention to the very rapid way in which a great bulging of the chest wall will correct itself after the removal of large abdominal cysts or tumors in the course of time.

The other point is the one mentioned by Dr. Ferguson of these patients bleeding to death in their own vessels. In this case I tried to take time by the forelock and institute intravenous infusion of salt solution and adrenalin before the abdominal incision was made. Several gallons of salt solution were put into the abdomen before closing the incision. I believe by adopting procedures along these lines we will avoid some deaths and do away with the necessity of repeated tappings before operation.

REPORT OF A CASE OF ANEURYSM, WITH A NEW METHOD OF LIGATURE OF THE LEFT SUBCLAVIAN

By J. Garland Sherrill, M.D.
Louisville, Kentucky.

Ligature of either subclavian artery in the first portion has always been considered a serious undertaking and its mortality has been high. This is especially true of the left artery, as very few surgeons have recorded efforts at ligature in this portion. Colles, the Irish surgeon, who has the distinction of first tying the right subclavian in its first portion, says: "This operation, difficult on the right, must be deemed impracticable on the left subclavian. For the great depth from the surface at which this vessel is placed, the direct course which it runs in ascending to the top of the pleura, the sudden descent which it makes from this to sink under the protection of the clavicle, and the danger of including in the same ligature the eighth pair of nerves, the internal jugular vein, or the carotid, which all run close to and nearly parallel with this artery—these all constitute such a combination of difficulties as must deter the most enterprising surgeon from undertaking this operation on the left side" (*Edinburgh Medical and Surgical Journal*, January 7, 1815, p. 23).

It is quite easily appreciable that a large aneurysm of the left subclavian encroaching upon the tissues of the neck, would make ligature in the first portion both difficult and

hazardous by the method usually employed. These facts, taken into consideration with the high mortality of the operation upon the right side and the inability to obtain a cure by distal ligature, have led me to study the possibility of attack from the posterior aspect of the chest. Previous to reaching this conclusion I had seen three cases of subclavian aneurysm, in two of which operation was refused; and in the third, which is recorded herewith, I applied a distal ligature with temporary benefit. This patient, Mr. Z., white, aged forty-five years, is a railroad employee, working as conductor in the terminal or in the claim office; has done no heavy work; no specific history. He was referred to me in April, 1902, by Dr. E. N. Flynn, his trouble dating from December, 1900; it began like an attack of la grippe, with cough and pain in the chest. This pain has been constant, with occasional exacerbations, and for some months has been located over the upper and anterior part of the left side of the thorax, extending into the neck and shoulder. The pain was of a throbbing, boring character. His voice was hoarse, and he suffered from dyspnea upon exertion; also occasionally had difficulty in swallowing. Opium and other drugs had no effect upon his pain and discomfort. He could attribute the condition to no direct cause, although in 1881 he was injured in a railroad accident and lost his left hand.

Examination revealed a pulsation over a space two and one-half inches in diameter at the upper part of the left side of the chest, extending out from the sternoclavicular joint. There was no episternal pulsation. Percussion over this space showed dulness and marked tenderness. Auscultation gave no bruit. The superficial veins of the upper part of the chest were dilated. The pulsation in the left brachial artery was felt with difficulty. Pulsation in the left carotid was not as marked as in the right. This was attributed to pressure from the aneurysm. The left arm was cooler than the right.

Diagnosis of aneurysm of the left subclavian was concurred

in by Drs. Flynn and Weidner. Upon presentation of the rest cure of Tufnell and ligature, patient decided upon ligation.

Distal operation in the third portion was performed on April 21, 1902, without much difficulty. The pulsation could scarcely be detected on the day following, and the pain had disappeared. Two days later his hoarseness had about disappeared. Tenderness still persisted over the dull area for one week, at the end of which time a limited pulsation could be felt at the second intercostal space, although there was no pulsation where it appeared before operation. The patient did fairly well until June 18, 1902, when he was seized with hemoptysis and attacks of dyspnea, and he died Sunday, June 22, no postmortem being allowed.

The result in the case just recorded led me to the conclusion that distal ligation would not prove satisfactory in treatment of aneurysm of this aretry, because of the large number of branches which allow the blood to flow through the aneurysmal sac. Distal ligation, too, would have a tendency to increase the blood pressure in the sac and thereby hasten its further dilatation unless prompt coagulation should occur.

In January, 1910, a colored man, aged thirty years, was admitted to the hospital; family history negative; claimed to have been well, except chills and fever at the age of nineteen. Subsequently stated, however, that he had occasional pain in the chest since August, 1908. The latter statement was not elicited until after operative interference was done. Never had any specific disease.

In August, 1909, he was injured in the subclavian region of the left side by a wagon crank; followed within one month by a swelling in the same region, which remained a few weeks and became smaller; to be followed in a short time by another enlargement in the same region, which also remained about a month and became smaller. The present tumor began to enlarge about December 15, 1909, and had gradually increased in size. The patient worked until Thursday

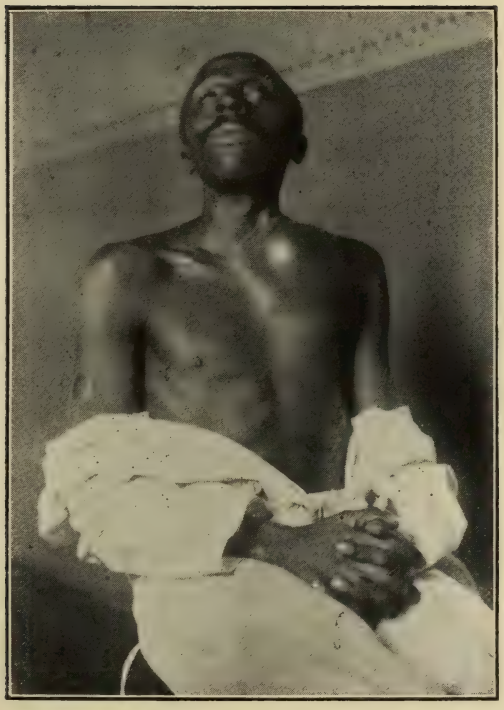


Fig. 1.—Aneurysm of left subclavian artery.

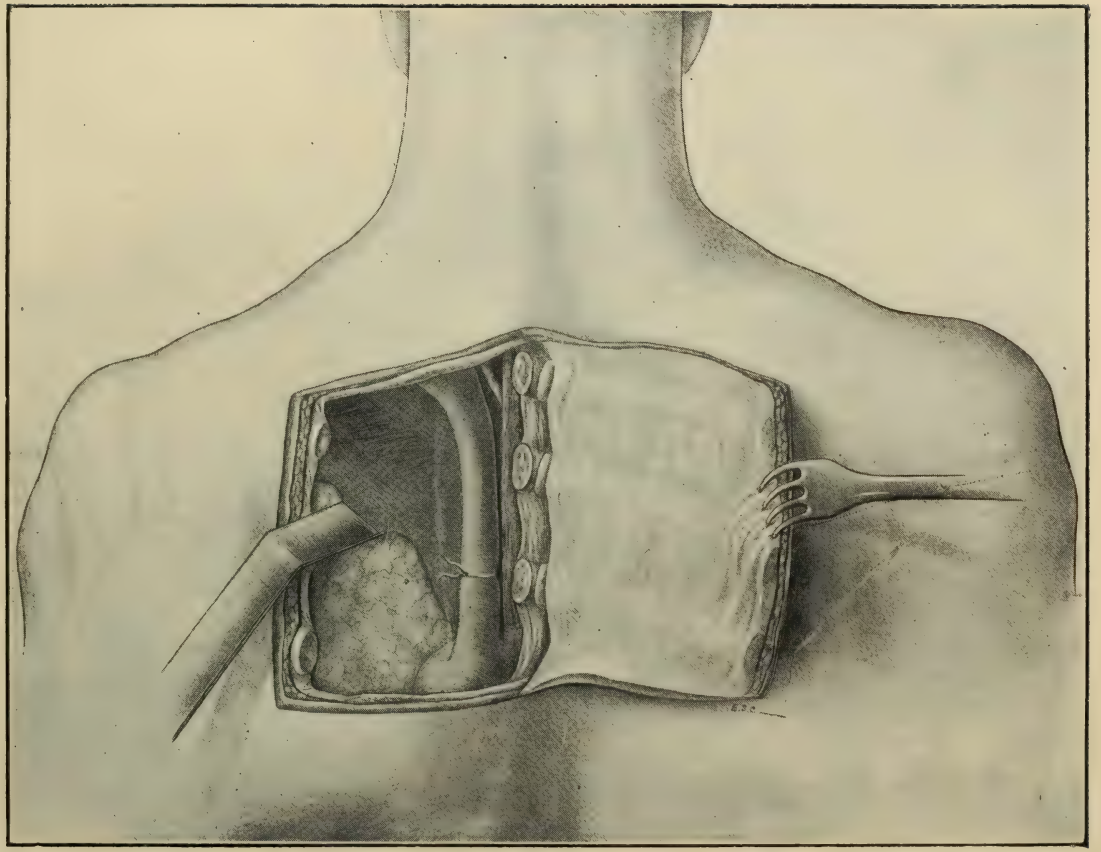


FIG. 2.—Showing incision and ligation of left subclavian artery.

before Christmas, at which time he discontinued, owing to the fact that he could not obtain work, suffering no discomfort from the tumor but remaining in the house since that time. At present he complains of pain and tenderness in the left shoulder, also suffers tenderness just above the spine of the left scapula and in the left axilla.

When I first saw him, about January 1, 1910, he had a pulsating tumor about the size of a small melon situated at the upper part of the thorax, extending from near the median line and just above the level of the clavicle downward and outward almost to the margin of the pectoralis major muscle. This tumor pulsated synchronously with the heart and was distinctly expansile in character No distinct bruit could be heard over the tumor, but an accentuated second sound of the heart was easily detected. The patient had an almost imperceptible pulse in the left radial, and it was delayed somewhat compared to that of the right radial. The pulse of the left carotid was synchronous with that of the right radial. Patient had no tracheal tug; had no marked dyspnea, although he was more comfortable sitting up in bed. He had no cough and no interference with deglutition or respiration. A diagnosis of subclavian aneurysm was made, and the various methods of treatment were discussed with the patient and with several physicians in attendance.

Distal ligation of the subclavian was considered inadvisable owing to the distance the tumor extended out upon the chest, and also because we believed that this measure would not prove curative. Ligature in the first portion anteriorly was not to be considered owing to the position of the tumor, which would have interfered greatly with the accomplishment of that step. After discussing the merits of wiring the sac and the possibility of complete cure if we could successfully ligate the subclavian in the first portion of its course by attacking it from the posterior surface of the thorax, the patient decided to accept the latter method.

On January 27, 1910, the subclavian was tied a short

distance from its origin at the aorta. The operation was performed in the following manner: An incision was made along the posterior margin of the scapula about four inches long, dividing the skin and the muscles attached to the posterior portion of this bone. It was joined by an incision running inward from its inferior extremity to the spinous process. A similar incision was carried from its upper end in toward the spine. The soft tissues were dissected from the ribs with the skin and all hemorrhage controlled. The second, third, and fourth ribs were removed for a distance of about three inches. The intercostal muscles were lifted off the pleura; the latter was gently pushed downward and outward with the finger, and the subclavian artery readily, came into view as it left the aorta at the level of the fourth dorsal vertebra. A small opening was made in its sheath and the needle was readily carried around it and a No. 3 catgut ligature placed in position. At this point of the operation it was discovered by the assistants that the pulsation in the aneurysm did not cease. We then discovered, much to our disappointment, that the diagnosis as to the location of the aneurysm had not been correctly made. Further search revealed below the origin of the subclavian a rounded mass seemingly not larger than a small orange, which was pulsating. On discovering this, we decided that the ligature upon the subclavian, being useless, should be removed. This having been accomplished, the wound was closed and the patient left the table in good condition, and within an hour he was conversing freely with the attendants in the ward.

Patient died February 7, 1910, on raising up suddenly in bed to eat his meal, although positively ordered not to make any sudden exertion. The postmortem demonstrated an aneurysm of the arch of the aorta in its lower portion, which had ruptured into the esophagus. While we failed to accomplish the object desired in this case, the cure of the subclavian aneurysm, yet we feel that the procedure employed

is feasible and an easy method of access to the first portion of the left subclavian.

This artery, to our knowledge, has only been tied successfully three times anteriorly in the first part of its course on the left side, by Halsted, Schümpert, and Jüngst. Dr. J. K. Rodgers, of New York, tied this vessel in 1846, but the case terminated fatally on the fifteenth day of secondary hemorrhage. Sir Astley Cooper abandoned the attempt to tie this vessel, thinking that he had wounded the thoracic duct.

Halsted states that the first part of the right subclavian has been ligated twelve or more times, with fatal result in each case.

B. F. Curtis reports a case of successful ligature of the first portion of the right subclavian for aneurysm in the third part. He thinks this is the first case on record in which this part of the subclavian had been successfully tied in its continuity, and states that according to Souchon's carefully selected statistics 16 cases have been recorded, all but two on the right side, with 16 deaths; in 2 of the cases the carotid also being secured. In this enumeration he does not include Halsted's successful case of preliminary ligature of the left subclavian before extirpation of a large axillary aneurysm. All of the deaths are due to secondary hemorrhage or other septic complications.

Tuffier ligated the subclavian in a woman for intra- and extrascalenous aneurysm. There was considerable induration, which made a successful issue doubtful, but three months later this had entirely disappeared and cure was complete.

The case reported by Jüngst, which has some features of interest, was performed for a gunshot wound in the left side of the neck. An incision was made down the neck parallel with the sternocleidomastoid muscle, meeting another at the sternoclavicular joint, passing directly outward along the clavicle. The inner third of the clavicle and the manubrium were resected subperiosteally. The left carotid was sought and followed downward to the arch of the aorta, and

there the subclavian artery was laid free and tied with a silk ligature, one and one-half to two centimeters from its origin. This did not control the hemorrhage, and a second ligature was placed on the distal portion of the vessel at the first rib. Recovery was tedious, with paralysis of the left recurrent nerve; voice was loud and harsh.

The left subclavian artery has been tied in its third portion, for aneurysm, four times—by Lizars, Warren, Dalton, and Codrington, with recovery in each case.

It has been tied in the third portion of its course, for traumatism, seven times—by Suckley, Watson, Church, Bowcock, McCausland, Parthey, and Matthiolus, with recovery in the four last cases.

J. H. Armsby reports 3 cases of ligation of the subclavian artery in the upper and middle portions of that vessel, one for aneurysm, one for bullet wound, and one for rupture from muscular exertion. All recovered.

He says the subclavian has been tied in its first division 13 times, with 1 recovery; in its second division, 9 times, with 4 recoveries; in the third, 164 times, with 83 recoveries.

From a study of the reported cases and my own work, the following conclusions seem to be justified: That ligature of the subclavian artery in the first portion on the right side shows a higher mortality than on the left. This is probably due in part to the short distance between its origin and the first branch, and also to its close relation to the pneumogastric nerve, thoracic duct, and the internal jugular vein. The mortality of ligature in the second division is 55.5 per cent.; in the third division, about 50 per cent. The mortality is greater when ligature is done for injury to the vessel than for aneurysm.

With present methods the mortality of ligature in any portion of the subclavian should be greatly reduced, as is shown by recent results of Halsted, Schümpert, Jüngst, and Curtis. Distal ligation has not proved satisfactory. When the aneurysm is situated high on the axillary artery, or upon

the distal portion of the subclavian, the anterior operation should be employed when the vessel is accessible. The method here described is offered for the treatment of those cases in which the aneurysmal tumor encroaches upon the tissues of the neck in such a way as to preclude the possibility of ligation by the anterior method. I have found that at the origin of the left subclavian from the arch of the aorta there is no danger of including the pneumogastric nerve in the ligature or of damaging the thoracic duct.

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DISCUSSION

Dr. Mack Rogers, of Birmingham.—In connection with this subject of aneurysm, I desire to call attention to a method of controlling hemorrhage that has been of great utility in these cases. It is the use of an ordinary white tape that is used for

binding purposes. It should be about twelve inches long and half an inch wide. An aperture is provided about one inch from the centre, through which the other end of the tape is carried after it has been passed around the vessel; then by pulling on the two ends of the tape, pressure is exerted over a broad area of the vessel, controlling the hemorrhage perfectly, yet it does not injure the vessel. By the use of this tape an assistant is in absolute control of the situation. He can increase or diminish the pressure on the vessel at will, while the operator is dealing with the aneurysmal sac, and this will greatly assist the operator in locating the vessels that enter the sac.

This method of controlling hemorrhage is, of course, not an entirely new one, but I wish to call the attention of this Association particularly to its application in these desperate cases of aneurysm. Recently a colleague of mine had an aneurysm of large size in Scarpa's triangle. Naturally the question arose as to the best method of controlling the hemorrhage. I suggested and used the tape on the external iliac by pushing the peritoneum up out of the way, and passing the tape round the vessel. This gave me absolute control of the vessel, while he dealt with the sac.

COMPLICATIONS FOLLOWING OPERATIVE PROCEDURES

By Lucius E. Burch, M.D.
Nashville, Tennessee.

All of us realize that no operation is without a certain amount of risk to the patient, yet most of us are prone to consider only the usual complications that are common to each individual operation, and to overlook the unusual accidents that will occasionally occur. It is my desire to call to your attention the unusual complications following operative procedures, some of these are unavoidable, the majority, however, can be avoided by a careful diagnosis and good judgment in the preparation and after-treatment of cases. The good surgeon has a mortality 1 or 2 per cent. lower than the man whose surgical skill is excellent but whose judgment is deficient. I will now relate to you some of my cases of so-called tough luck, and also bring to your notice the misfortunes of some of our brother surgeons. In looking back over the unforseen accidents that have occurred in my own work I can readily see many glaring errors in judgment. In some instances, however, I am unable to fathom the secret of avoiding some of the unusual complications that have occurred. While shock, hemorrhage and sepsis are the complications to be most feared from the ordinary operation, yet to the conscientious surgeon there are many other complications to be considered in advising any operative procedure, however trivial its nature. Perhaps it is not advantageous to relate one's sad experiences, yet I am sure

that many fellows of this body representing the cream of American surgeons have had similar experiences.

Case I.—The operation was one of interval appendicitis. The patient ran a perfectly normal course until the twelfth day, when suddenly while talking to her nurse she fell over and died in a few minutes. She had no organic disease of any kind and death must have been due to a thrombus. I consider this as one of those rare cases of unavoidable death, yet it is well to remember that sudden death may occur following any operative procedure, and if a patient has a high pulse rate or edema or any symptoms whatsoever of recent thrombosis, operation should be postponed, provided the case is not one of great emergency.

Case II.—The case was one of sepsis following the ordinary ligature operation for hemorrhoids. All went well until the bowels were moved, which was followed by a hard chill, and this by a rise in temperature and a profuse sweat. This same phenomena occurred after each movement of the bowels and in the last stages of the illness it occurred without a bowel movement. The blood showed staphylococcus and colon bacillus infection. Pneumonia developed which soon overwhelmed the resisting powers of the patient. Sepsis is a most unfortunate complication, and one that is especially to be feared after hemorrhoid operation. The area of operation is in a region that is almost impossible to surgically cleanse, and over this surface the poisonous contents of the bowels are obliged to pass. It can be avoided in many instances by building up the general condition of the patient, and if the hemorrhoids are in a state of inflammation, operation should be deferred until the inflammatory process subsides. It is most unwise to let a patient with large inflammed hemorrhoids to continue at his avocation until the day of operation, for it is in this very class of patients that complications are most likely to occur.

Case III.—This case was one of suppression of urine following the evacuation of a pelvic abscess under nitrous oxide

anesthesia. The patient's urine before operation showed albumen, pus, hyaline, and a few granular casts. The duration of operation was two minutes, and the patient recovered consciousness as soon as the inhaler was removed. A suppression of urine followed which lasted for thirteen days, when nature reasserted herself, and the patient made an uneventful recovery. I have already published this case, and will not go into the details of the treatment that were carried out, but will add that every drug that has been recommended for this complication was faithfully tried without effect, and I attribute my success to keeping the patient well nourished and throwing as much work as possible on the skin and bowels, and to the use of a saline solution, both as a hypo and enteroclysis. Suppression of urine will sometimes occur following operative procedure, but this case well illustrates the fact that it is especially liable to occur with suppurating conditions, whatever the anesthetic may be, and it also demonstrates the length of time a patient may live without the kidneys acting, and then make a good recovery. This complication in this particular case was certainly unavoidable, but I know that many of us in operations of great emergency do not lay sufficient stress on urinary findings, and when these show pathology of the kidneys, a local instead of a general anesthetic should be the preference, if the nature of the case permits.

Case IV.—This case was one of appendicitis with drainage of a diseased gall-bladder. All went well for a week, when a rise of temperature occurred associated with a pain over the liver. In the course of time the typical symptoms of a subdiaphragmatic abscess appeared. This was evacuated and the patient made a good recovery. Fortunately, this complication is a rare one, yet when there is a disease of the appendix or gall-bladder, it will occasionally occur, and it should be considered in giving a prognosis for these very common operations.

Case V.—This case was an acute dilatation of the stomach following hysterectomy for a giant fibroid. The stomach

tube was used without success and the patient died within a few days following the onset of this condition. A gastro-enterostomy was not attempted on account of the desperate condition of the patient. This is another rare complication, but it should be considered as a possibility following operative procedure.

Case VI.—This case was one of gangrenous appendicitis with free fluid in the abdomen. The appendix was quickly removed, and a drainage tube placed both at the side of the stump and in the bottom of the cul-de-sac of Douglas. The patient was placed in an exaggerated Fowler position and the Murphy drip enema used. The patient did unusually well for the first week, with the exception of a few abdominal pains. On the eighth day he was seized with a severe pain in the right iliac fossa, which was associated with a certain amount of shock, and in a short time the typical symptoms of abstruction were manifest. The abdomen was opened, and the lower end of the ileum was found to be twisted on itself and agglutinated by firm adhesions. The obstructed portion was freed, and the gut above the site of obstruction was opened and the contents were evacuated and carried to a vessel at the side of the table by means of a rubber tube. The incision in the gut was then approximated, and the abdomen closed. The patient rallied and made a slow but perfect recovery. This complication was unavoidable and terminated very favorably, at the same time we must not forget that intestinal obstruction is a most dangerous complication, and one that is not so very rare after abdominal section. It can usually be avoided by proper peritoneal toilet, but there are a class of cases in which we are compelled to leave raw areas within the abdomen, and it is in this very class that it is most likely to occur. It is to be hoped that the future will show that animal oil poured over peritoneal surfaces will prevent the reformation of adhesions as well as obstruction.

Pneumonia is a complication that I am sure all of us have

had more or less experience with following operation. A careful selection and administration of the anesthetic, with the proper protection of the patient during the operation will prevent this complication in a great majority of cases. In spite of all precautions it will occasionally occur and it must be considered in giving a prognosis as to the outcome of any surgical procedure.

Sir Frederick Treves reports a case of an almost uncontrolable hemorrhage lasting for twelve days, following the removal of a small epulis from the gum of a child. The patient had hemophilia, and this condition was not discovered until after the operation. This same eminent surgeon reports a case of sepsis which almost ended fatally. following the removal of a sebaceous cyst. The patient had diabetes and the urine was not examined until after the operation. A well-known specialist reports a case of a death on the table following tonsillectomy and adenoid operation. Inquiry into the patient's history after death showed that he had been convalescent from diphtheria for only a few weeks.

It is a most unpleasant topic to relate one's own misfortunes, but in many instances they are of more value than one's brilliant results. Kidney surgery today would not be on the safe footing that it is had it not been for a distinguished fellow of this society relating a nephrectomy case which terminated fatally in twelve days, and postmortem examination showed that he had removed the only kidney the patient possessed. This one case showed to the surgical world that a nephrectomy was not to be considered unless the presence of another kidney was not only demonstrated, but it is also essential to determine its activity by means of the uretral catheter.

In conclusion I desire to emphasize the following points: (1) That many of the accidents following operative procedures are preventable; some few are not. (2) No operation should be advised, however trivial in character, unless there is positive pathology to indicate its performance. (3) That

no operation should be carried out either under a local or a general anesthetic until a careful history of the case is obtained, including a thorough physical examination, with urinary and blood findings. (4) That better results would be obtained and fewer accidents occur if patients are given preliminary treatment before operation. (5) That surgeons should never state to patients that any operation of any kind is totally free of danger.

DISCUSSION

Dr. Ernst Jonas, of St. Louis.—I wish to put on record one case of cervical repair of the neck of the uterus. This patient had a most profuse bleeding after the operation, and careful investigation showed that there was a hemophilic disposition in the family.

Dr. T. J. Crofford, of Memphis.—The essayist mentioned a case of suppression of urine after thirteen days. I have lost several patients from suppression of urine because, perhaps, I had not studied the cases carefully enough before operation. However, there was no disease of the kidney that could be ascertained. I should like to know if any of the members think or believe that the Trendelenburg position during an operation favors the suppression of urine.

AN IMPROVED TECHNIQUE IN GOITRE OPERATIONS

By John R. Wathen, A.B., M.D.
Louisville, Kentucky.

While much attention has been given to the pathological and clinical aspects of goitre in its various forms, but few changes have been made in the original operative technique as has long been practised by Kochers and others.

The method of operation, as illustrated by the accompanying photographs, has for its recommendation simplicity, rapidity, and safety, the three most desirable points in technique.

It has been based upon an experience of 142 operations for the different types of goitre, with no case of injury to the recurrent laryngeal nerves or any clinical evidence of injury to the parathyroids.

The use of the scissors has replaced entirely the knife, and all the structures, beginning with the skin, and later the enlarged thyroid gland, are elevated and approached from the under surface. This lessens the hemorrhage by placing the parts on the stretch, makes the work more rapid and safer, and allows of easier blunt dissections to be made.

The neck is opened, as shown (Fig. 3), by pinching up the skin with the fingers and making a small cut through the skin and the platysma. The cut surfaces are now grasped by volsellum forceps and traction is made upward, next blunt pointed, curved scissors are used as a dissector (Fig. 4), and

the skin with attached platysma are rapidly separated from the muscles below and then cut along the curved line used by the Kochers (Fig. 5).

By continuing the upward traction the two large skin flaps are dissected up to the hyoid bone above and to the sternum below (Fig. 6).

The ribbon muscles are now separated in the middle line and clamped high up and cut one on or both sides when needed, as has been suggested and practised by C. H. Mayo (Fig. 7).

The fibrous and the true capsule over the goitre is next opened, and with a large pair of volsellum forceps the enlarged lobe is elevated and traction is made in an upward direction and to the opposite side of the neck (Fig. 9). This readily allows the capsule to be dissected downward and places the bloodvessels to be ligated on the stretch, causing less venous hemorrhage, and relieves the trachea of pressure from the weight of the tumor.

The vessels can now be clamped as the elevated goitre lifts them away from the surface of the capsule (Figs. 10 and 11). The capsule adherent to the posterior structures is thus separated from the vessels and there is no danger of the nerve being included with the vessels or any danger of injuring the parathyroids. Occasionally when the enlarged lobe extends high up in the neck, it is better to place a second small volsellum forceps on the upper part and make traction upward and downward to better expose the superior thyroid artery and vein.

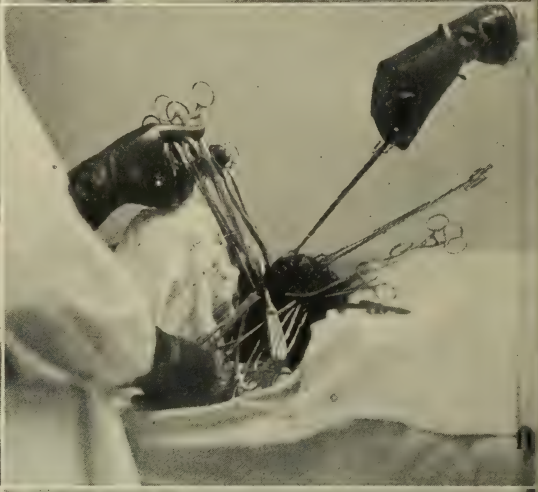
This constant upward traction on the tumor allows it to be rapidly dissected from the posterior structures and only held by the isthmus of the gland. A large clamp crushes this part, which can be sutured over.

The capsule, muscles, and skin are now closed in the usual way and drainage provided through a stab wound in the lower flap.

This technique differs from that of others in that it does

IG. 1.—Goitre before the operation.
IG. 2.—Prepared for the operation.
IG. 3.—Making the incision with the scissors.

FIG. 4.—Elevating the skin and separating with the scissors as a dissector.
FIG. 5.—Cutting the skin and the platysma.
FIG. 6.—Sternomastoid and sternohyoid muscles exposed.



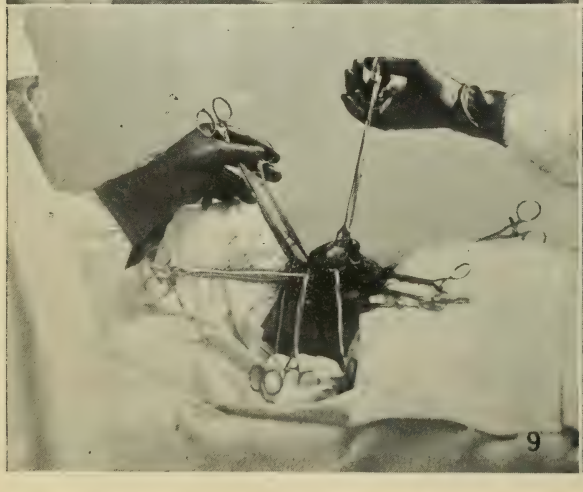


Fig. 7.—Cutting sternohyoid and sternothyroid muscles between clamps.

Fig. 8.—Goitre under capsule.

Fig. 9.—Goitre elevated and capsule dissected downward.

Fig. 10.—Inferior thyroid vessels exposed ready for ligation, within the capsule.

Fig. 11.—Superior thyroid vessels exposed.

Fig. 12.—Goitre remaining attached only by the isthmus.

not employ the knife, which is dangerous in neck surgery, it cuts the skin and superficial structures, only after they have been elevated and dissected up from below, and it grasps the goitre with volsellum forceps and elevates it away from the dangerous area underneath.

This constant traction causes much less hemorrhage and allows of a rapid operation, within plain view of the surgeon. It is surprising how few forceps are used when the venous hemorrhage is thus controlled.

COLLAPSE OF THE TRACHEA WHILE PERFORMING THYROIDECTOMY

By T. C. Witherspoon, M.D.
Butte, Montana.

Interest in any particular surgical procedure centres not alone in accomplishing satisfactory results by some definite technique, but also in avoiding dangerous situations, the result of irregular anatomic relations, developmental defects, pathological changes or physiological idiosyncrasy. How unfortunate for statistics is some unusual adhesion to the thinned coat of an important vessel or hollow viscus; the mal-relation of some vitally necessary tissue to the field of operation; the extension of infection beyond safe encapsulation. Yet these are the conditions which characterize surgery and necessarily possess a lively interest for those who daily may meet with them.

The subject of this paper directs attention to one possible complicating difficulty in the performance of thyroidectomy. This operation for hyperthyroidation or exophthalmic struma is always more or less serious because of the marked vascularity of the gland, the friability of the bloodvessels, the capsular adhesions, the loss of general vascular tone, and the tremendous nervous excitability. In addition to this, the relation of the gland to the vessels and nerves of the neck, the danger of removing the parathyroids, and the possibility of collapse of the trachea during the necessary operative manipulation of the gland makes thyroidectomy one of importance when done for any condition whatever.

During the last fourteen months I have twice had the trachea collapse while performing thyroidectomy for exophthalmic goitre, and these experiences suggested this paper.

The first occurrence was in a woman, aged fifty years, who was admitted to the hospital, October 26, 1909. The goitre clinically and pathologically was hyperplastic in type. To the examining finger it was about three to four times the normal size, more especially the right lobe. A Kocher Kragenschnitt was made. Vascularity was marked, as was also friability of the vessel walls. While attempting to raise the inferior pole of the gland out of its bed, the superior vessels having been tied and cut, a marked dyspnea began. Bleeding from the wound was rather free because of the labored efforts to obtain air, and this flooded the operative field with blood. An effort was made, by the doctor helping me, to catch a bleeding vessel at the lower part of the wound, and immediately all air was completely shut off from the lungs. A transverse snip of trachea, which was found collapsed, revealed the fact that the forceps had partly included the trachea in its bite. No preparation having been made for such an occurrence, the trachea wound was held open during the completion of the operation by forceps. Fortunately the trachea remained open after removing the right lobe and isthmus of the thyroid, thereby avoiding the use of a tracheotomy tube. The transverse tracheal wound was closed with catgut. The neck wound was drained in the usual manner. November 2, the patient was discharged, the wound having healed. Prophylactic doses of sodium salicylate were used to prevent pneumonia or local infection. Progress was normal throughout.

The second occurrence was also in a woman, aged thirty-nine years, who was admitted to the hospital September 29, 1910, suffering from a moderate exophthalmic goitre and a cystadenoma of the breast. The breast was removed the following day. After recovery from this, October 10, the right lobe of the thyroid and a much enlarged central mass

of thyroid tissue were excised. The collapse of the trachea again occurred while shelling the gland from its capsule. The difficulty of this operation was much exaggerated by the thyroid tissue, which saddled and interfered with access to the collapsed trachea. The trachea was entirely out of sight when the collapse occurred, but the former experience led to the immediate recognition of the trouble. This case presented another difficulty in that the trachea seemed to have no power to retain its normal rotundity even after removal of the thyroid, and a tracheotomy tube had to be used for twenty-four hours to prevent its recollapsing. After this time a simple gauze drain in the neck wound was used. The wound became infected, though the patient eventually made a complete recovery. No pneumonia developed, though grave fear was entertained it would, because of the direct opening into the trachea from the suppurating wound.

Collapse of the trachea is not very common, judging from records, yet I suspect it is commoner than these might lead us to believe. These two cases have been the only ones in my experience; both occurred within the short period of a little more than a year. The views of many as to the cause and the treatment (preventive and curative) of collapse are a bit at variance with mine, formed by this limited experience. This leaves me to conjecture whether my cases were unique or my observations incorrect.

That predisposing cause of collapse of the trachea is the anatomic defect in the rings posteriorly. This allows the lateral walls to approach closer under pressure and to change the cross-section of the tube from a circle to an oval with its long diameter anteroposteriorly.

Another factor which I am inclined to believe partly influential in starting a collapse, is the proximity of the recurrent laryngeal nerve to the thyroid gland. This nerve, even though avoided in the use of knife or forceps, is subjected to more or less trauma by pulling or pressure while removing the gland. This leads to abductor paralysis with

consequent labored inspiration and the production of a marked negative tension within the trachea.

Lastly, it is possible that more or less softening occurs from the toxic effect of the gland secretions. Rose and Eppinger records pathological changes, but E. Muller found nothing of note. In my two cases no pathological examination of the cartilages could be made, but to touch and to vision there was no evident softening.

The symptoms of collapse began while trying to shell the lower pole of the thyroid out of its capsule. Labored inspiration was immediately marked, and the arterial blood quickly became venous. In the first case the examining finger easily detected a completely flattened scabbard trachea, but in the second, owing to the mass of thyroid tissue about the trachea, it was impossible to absolutely diagnosticate the condition by touch until the central lobe was removed. This had to be done in the face of a very free venous hemorrhage, and the situation was anything but inviting. As soon as the trachea was reached, in both instances, an immediate opening was made and air admitted to the lungs.

In both of the cases I had to deal with collapse of the scabbard trachea. In the work of Ochsner and Thompson on the "Thyroid and Parathyroid Glands," collapse is spoken of as a condition resulting from loss of support given by the gland to a soft and plastic trachea. The anterior wall is described as then falling in like a valve. No mention is made of the collapsed condition I have described as existing in my two cases. Kocher has called attention to the fact that the anterior wall is the most resistant part of the tube, and uses this as a fulcrum over which to tie sutures embedded in the lateral wall, to prevent or relieve collapse.

It is possible that in the experience of others this anterior wall collapse has been usual, but I do not see the reason for it. In the first place, the entire series of rings would have to be very soft, otherwise a rebound of the cartilages would tend to keep the lumen of the tube open as soon as pressure

is removed. In the second place, the tendency of thyroid pressure to make the cross-section of the tube oval, with its long diameter anterior-posterior, would give to the anterior surface of the trachea the greatest weight or pressure supporting capacity, and to the laternal walls the least. The only occasion for such an anterior collapse, as I see it, is the removal of a retrosternal median growth of thyroid which occasions a considerable degree of pressure upon the trachea immediately anteriorly.

The type of obstruction resulting from kinking of the trachea due to an irregular point of pressure from a thyroid growth above the sternum is immediately relieved by removal of the growth, and does not give the symptoms of collapse here spoken of.

The question naturally is presented; how shall these conditions of tracheal collapse be guarded against? Kocher has suggested that in all scabbard tracheas in which collapse is apt to occur it is best to introduce two lateral sutures, one on either side, and tie them over the anterior face of the trachea. The impossibility of doing this in some cases is shown by the second of mine. It was quite out of question either to determine the shape of the trachea or to use such sutures until the gland was removed in large part. In the first case this might have been done had I suspected such a possibility.

The method of cutting the isthmus and removing the middle lobe first, then working outward, might be recommended as doing away with the evil of pressing against the trachea through the thyroid while shelling it out. Yet I believe few operators who have done thyroidectomy a score of times or more would use this method as routine. I am convinced the condition in which collapse is going to occur is not definitely definable beforehand, and an operator must follow some definite technique in performing all the operations. In my cases collapse unquestionable was aided, if not wholly caused, by pressure in the trachea while enucleating the

lower larger pole of the thyroid. This was done, too, without undue haste or force, and the shut-off in breathing came in both as a surprise.

The one prophlactic measure which I suggest as a means of avoiding pressing upon the trachea is a parasternocleidomastoid incision. This enables the operator to raise the gland out of its bed without medianward pressure of appreciable degree. No doubt a collar incision, with enucleation from between the sternohyoid and sternothyroid muscles of either side, necessitates a considerable pressure upon the trachea. While working out the problem of removal of the thyroid under local anesthesia I found it very much easier to do so by the paramuscular than by the collar incision. Manipulation was easier and discomfort minimized. I experimented upon the cadaver in developing a technique, and removed over twenty goitres under local anesthesia before using a general anesthesic. This is excluding my first case operated upon in the early nineties, to which chloroform was given.

Of late years I have used the collar incision, possibly modified slightly, but I am rather of the opinion that my former plan of a paramuscular incision gave a better field, made operating easier, and did not leave an uglier scar. I believe this incision would prove a valuable prophylactic against tracheal collapse.

As to treatment at the moment of collapse, all agree that a suture or hook, which enables the operator to pull open the trachea, is most desirable, but this is, in fact, not so easily applied in many cases, I judge, reckoning from my own experience. If it can be done, of course resort to the measure, but if not I shall not hesitate to open the trachea in the wound. The fear of pneumonia is not as great as it would seem if proper surgical care has been taken. In the majority of cases I am certain the tracheal wound can be immediately closed with catgut and the neck wound treated as usual. It has not been my experience that suppuration occurs after

thyroidectomy as often as the very universal custom of draining the wound indicates. I rarely find drain necessary. When the trachea collapses after opening it, and when left without support, following complete removal of one or even both lobes (a condition which must be somewhat rare), a tracheotomy tube becomes a necessity. Handling the case afterward is conducted along well-prescribed lines.

I have not had, nor have I seen collapse of the anterior wall, but in the cases of pressure collapse while removing a retrosternal growth of thyroid, I am inclined to believe that as soon as the growth is out the trachea will open through the elasticity of its own cartilages.

DISCUSSION OF THE PAPERS OF DRS. WATHEN AND WITHERSPOON

Dr. Robert T. Morris, of New York City.—The chief danger from collapse of the trachea is collapse of the surgeon. Any one of experience will have a number of resources at hand to meet this emergency. I would offer this suggestion right now: In cases where we anticipate collapse of the trachea we should resort to intratracheal anesthesia, as the tube prevents collapse, allows us to work deliberately and afterward suture the collapsing rings to structures near at hand, and, at the same time, prevents the patient from breathing across the wound, carrying infection from the breath into the wound of the neck. The infiltration method of anesthesia is preferable in these cases for the most part, but in a certain number of instances we may anticipate collapse of the trachea, and when we do, let us use intratracheal anesthesia.

Dr. Hubert A. Royster, of Raleigh.—I am glad Dr. Wathen called our attention to the use of the scissors. I referred yesterday to some of the things we have in surgery which were taught us by the older men. In 1867 Frank H. Hamilton was a strong advocate of the scissors in surgery, so much so that he became known as the "scissors surgeon." We heard a good deal yesterday from Dr. Bovée about "contemporaneous syndicate operations." I wish to state that is a good deal better than chronic surgery, and the trouble with many men in doing this sort of work is they are doing somebody else's operation instead of their own operation according to somebody else's method. The scissors has a place in surgery which the knife can never

fulfil in many instances, and Dr. Wathen has emphasized it so beautifully that I merely take this opportunity of emphasizing it as he has done in connection with this technique.

It is absolutely unfair to state that thyroidectomy is a difficult operation. Teachers and clinicians are always trying to make operations hard instead of trying to make them easy. If we will look upon a thyroidectomy very much as we do a hysterectomy, we will be able to get over the operation with much more ease and safety. The incision, the breaking up of adhesions, the delivery of the tumor, the tying of the vessels before we cut them, and closing the wound with or without drainage, all illustrate in the thyroid the same steps as we would carry out in removing a fibroid tumor. I cannot understand how it is always necessary to cut muscles. We are doing it because somebody told us to do it. It is just as sensible for one to say that you must cut the abdominal muscles across in every case in doing a hysterectomy as it is to cut the muscles of the neck in doing a thyroidectomy. You can remove numbers of thyroids by retracting the muscles as you do the recti without cutting them, and if it is not necessary to cut these muscles, why do you do it? The thyroid operation is going to be difficult in some cases, particularly malignant ones, and those which are fixed and widespread, but under ordinary circumstances I submit that thyroidectomy is not a difficult operation, or else some of us could not do it. I wish to commend Dr. Wathen's technique, and to say that I shall follow it as closely as possible in the cases in which I have to do it.

Dr. Randolph Winslow, of Baltimore.—I have had two cases of collapse of the trachea, or, at least, of arrested or difficult respiration in the performance of thyroidectomy. One was undoubtedly a collapse of the trachea in a case of exophthalmic goitre in a young girl, and which only came on after the right lobe of the gland had been removed. There was then difficulty in breathing; the trachea was collapsed from side to side; it was a lateral and not an anteroposterior collapse. It did not require tracheotomy. The collapsed trachea recovered of itself, and although there was some little embarrassment to respiration for a few days, the girl made a complete recovery.

The other case was in a woman with a large fibro-adenomatous goitre, which evidently was not a collapse of the trachea. The woman's condition was very serious previous to operation. The difficulties of removing the growth were so great that I did not use a general anesthetic, but made use of local anesthesia, with Schleich's solution, and in addition morphine and scopolamin. After the operation was begun the woman's respiration ceased and she became black, and it looked as if she was going to die. Her pulse, however, continued good. A quick severing

of the isthmus was made, and the thyroid pulled over to the opposite side, which relieved the pressure upon the trachea, and her respiration became normal and she recovered promptly.

These are the only cases I have seen in a moderately large experience. I am very much pleased, indeed, with the demonstration of Dr. Wathen, and I have no doubt those of us who have been accustomed to operating on the gland will be very materially benefited by this demonstration.

In regard to the statement made by Dr. Royster a few moments ago, about cutting the ribbon muscles. In the majority of operations I have not cut these muscles, and in a certain number I have cut them. We cut the ribbon muscles when it facilitates our surgical work, but we do not cut them if we do not see the necessity for so doing. That is the attitude I assume.

Dr. Le Grand Guerry, of Columbia.—We have listened to two excellent papers, and I am sure we shall all profit by them. There is one point in the technique that impressed me very much, and this was especially suggested by the second paper on tracheal collapse.

I wish to ask Dr. Wathen, when he closes the discussion, if he will not express himself on this point, and that is, it appears to me, in looking at his description of the technique, the method of constant upward traction on the lobe in the removal of the gland, thereby pulling on the trachea, would predispose to tracheal collapse. I would like very much to have Dr. Wathen answer that point in his closing remarks.

Dr. Ernst Jonas, of St. Louis.—If I have grasped the point made by Dr. Witherspoon correctly, he takes the position that the main danger for the collapse of the trachea comes at the point when we try to make a thorough and complete enucleation of the gland, especially the inferior lobe. For quite a while we have made a little change in the technique, which, perhaps, does not look quite so neat as the complete enucleation of the lobe, but which prevents absolutely interference with the inferior laryngeal nerve. We cut through the lower lobe and leave enough of the lower lobe for the protection of the inferior laryngeal nerve. This little point in technique makes it superfluous to pull much on the thyroid lobes, and avoids, therefore, the danger of collapse of the trachea. By cutting through the lower lobe in the same way as we would enucleate a fibroid tumor in abdominal hysterectomy, applying forceps first, and then cutting through, we can enucleate the thyroid gland without pull.

Dr. Witherspoon has pointed out in his paper that we should always be prepared for complications from the trachea, and for that reason he advocates to have a tracheotomy tube ready. That is good advice, but in case we have no cannula ready it is easy to keep the trachea open by sewing the trachea to the

skin. This holds the trachea nicely open, and there is no further danger.

Dr. Wathen (closing).—I have nothing to add except to answer a question asked by one of the speakers as to traction upon the trachea and a probable collapse. I take it that constant pressure of the tumor upon the trachea has degenerated to a certain extent the normal cartilaginous rings; and further, when operating we cause pressure over the trachea which breaks the cartilaginous rings, and that is the prime cause of the collapse. With this upward traction I put no weight at any stage of the operation upon the trachea, and in 142 cases I have not had the slightest injury to the trachea by this operation or injury to the recurrent laryngeal nerve, or any clinical signs of parathyroid disturbance.

Dr. Witherspoon (closing).—I want to say a word or two more: First, in connection with Dr. Morris' suggestion of intratracheal anesthesia, when we suspect collapse of the trachea. I should like to know how he determines when we are to have or may suspect a collapse of the trachea. I have not been able to tell. Of course, a scabbard trachea we can clearly define at times, and it would lead us to suspect that the trachea might collapse. In many cases, on the other hand, the trachea is scabbard when examined before proceeding to operate, due to lateral pressure. In neither of the cases reported by me was the pressure marked. This collapsed condition has come on in cases that otherwise have seemed simple to me. I would have divided the sternohyoid and thyroid muscles had I suspected the pressure of manipulation would add to the possibility of collapse, but that seemed so small and the enucleation was so easy that it did not occur to me this thing was necessary; while I was simply shelling out the lower pole of the gland the collapse occurred. It was not due to excessive pressure, to undue haste, or anything out of the normal in the course of such an operation, so that we cannot look upon the possibility of causing these collapsed conditions lightly. I think these cases of tracheal collapse may occur to any one of us, and they are certainly a source of discomfort to the operator.

As to the remarks of Dr. Morris that the surgeon must not lose his head, I am reminded very much of the instructions we received on morphine poisoning by the professor of that branch. He said there were three remedies for morphine poisoning: (1) Keep cool; (2) keep cool; (3) keep damn cool! That is just the recommendation here; but it is hard for anyone to keep cool when the trachea of a patient has collapsed and the patient is is becoming purple. You must get at it quickly. I have opened the trachea right in the neck, as these patients want air in the lungs as soon as they can get it. They are weak. They are

people of a nervous irritability and instability, and they are in no condition to stand much handling. The main thing is to get air into the lungs, and then deal with the cuts afterward.

Dr. Morris.—In a case of anatomic defect I do not know that we can anticipate collapse, particularly in a case of pathological process from pressure, where the patient has previously given evidences of obstruction of the tracheal rings; and in a case of that sort I think we may anticipate tracheal collapse, and in that event we should use intratracheal anesthesia.

OMENTOPEXY

By Maurice H. Richardson, M.D.
Boston, Massachusetts.

I have seen so many disappointments, even after the most hopeful signs, that I am but too much inclined to gloomy prognoses, under all surgical conditions which have thus far proved hopeless or discouraging. This tendency, I regret to say, has been but too often justified by the outcome of all new non-operative treatments of cancer. I cannot but feel, however, that there is coming, and, I hope, soon, a non-operative cure for cancer. In non-malignant lesions, too, I have been but too pessimistic. In tuberculosis—for example, of the kidney—the prognosis has always seemed so bad that I undertook such radical treatment as nephrectomy with about as little hope as nephrectomy for malignant disease.

My point, just now, is the inevitable, or, if not the inevitable, the almost resistless tendency of the world toward gloom in those lesions in which surgery has hitherto proved ineffectual, if not useless. These lesions comprise malignant disease; tuberculosis in certain localities; ptoses, and most other complaints in neurasthenia—for which surgical operations are performed. Many emergency lesions should belong to this group, like acute infections of the pancreas with fat necrosis, and all forms of advanced peritonitis. The same hopeful beginnings in the surgery of the cerebrospinal system have been followed by the same too gloomy prognoses.

It is essential that we test surgery, whenever it is reasonably indicated by theory, or by induction, or by rule of thumb, too see whether, after all, we have not been too gloomy in jumping to the conclusion that, because in theory a certain procedure does not appeal to our reason or common sense, it will therefore prove ineffective in practice.

My title seems one upon which there is very little to be said, and that little of slight value; but to my mind it is suggestive of many surgical questions which have always interested me, and a presentation of which will, I trust, interest you.

The first thought I had when the operation of omentopexy was proposed and performed, was one of incredulity—not to say ridicule—that any man of common sense should propose such an operation. It was not until some time after this that I was willing even to talk about it, much less apply the principle to one of my patients. But after many years experience, one learns to realize how little he really knows, and how rash he is, to condemn as unreasonable or hopeless, or ridiculous, any suggestion, especially on the ground that it is contrary to experience or even to reason.

It seems to be, with me, at least, a regular thing first to oppose, then to tolerate, and finally to embrace a new and perhaps apparently absurd idea. The subject of my remarks—omentopexy—is a case in point. The theory is a good one. Sidetracking the portal circulation is, in plan, all right, but how often could we expect to find veins of communication developing to any really practical size through the adhesions which are made to unite surfaces drained, the one by the portal, the other by the epigastric veins? Absurd, is it not, to expect this in any reasonably brief time—in any time short enough to be of any practicl value to a desperate patient? But let the scoffer remember his experience with pelvic tumors nourished by adhesions with the omentum; for example, let him recall, as I can, veins as large as a lead pencil, and arteries as large as the

radial—all through adhesions—all developed by an enforced circulation—by the necessity for vascular nourishment caused by the curtailment of the pedicular vessels.

But, whatever my experience with pelvic, especially fibroid tumors, to reckon deliberately upon the development of an abnormal circulation for the relief of so hopeless a condition as the ascites of cirrhosis, seemed really absurd.

Be that as it may, the theory was plain enough, and I undertook the operation at the Massachusetts General Hospital.

The patient upon whom I operated first, in 1904, Mrs. W. (Office Records, vol. 91, p. 15), is, up to 1910, well. Is it likely that the condition of general good health is wholly due to the relief of a symptom? Is it not possible, at least, that there has been a real restoration or an improvement in the hepatic condition?

But hepatic cirrhosis in its pathology does not admit of cure. Is it not essentially an incurable disease, and is not the disappearance of the chief symptom regarded as a cure more apparent than real?

With regard to that, it would certainly seem unlikely that relief of ascites should follow, or relief rather of the portal obstruction—unless the interstitial pressure of the acini upon the portal radicals is aggravated by the blood stasis which it causes. Just as intestinal obstruction, when not quite complete, is sometimes made complete by increasing with cathartics the proximal intestinal peristalsis, while it is lessened sometimes by overcoming completely that peristalsis, so may it not be possible by relieving an aggravated blood obstruction to diminish also that obstruction? Such a suggestion, of course, implies that an interstitial process is capable of disappearance—a cirrhosis of the liver or of the kidneys a cure. But so far as we know, such an event is impossible. Fortunately, perhaps, for our theories or our facts, things happen not as we expect or predict, or as, by our theories and observations, they should. A long

experience in clinical phenomena will assure a candid observer that there are many so-called *facts* that are not facts, many apparent impossibilities that are possibilities, many so-called hopeless conditions that prove hopeful. But in all cases like those under discussion there is always the possibility of human error and fallibility, the possibility that the real condition which causes an ascites is not as bad or as far reaching as we suppose.[1]

But this element of error in diagnosis upon which the prognosis as to ultimate recovery may be less grave, is, of course, begging the question of a possible cure in hepatic cirrhosis. I suppose there is really no more possibility of ultimate restoration of the portal circulation through removal of the cause of obstruction than there is a possibility of a new leg growing from an amputation stump. It will, nevertheless, be of interest to see what the ultimate results are in cases such as I am able to report in this paper.

Massachusetts General Hospital, West Surgical Records, vol. 465, p. 27. March 11, 1904.

T. G., aged twenty-nine years, single, shoemaker. Transferred from medical wards with diagnosis of cirrhosis of liver.

History. Indigestion for a year; jaundice for three months; ascites six weeks; 170 ounces withdrawn March 3, 1904, but filled up rapidly.

Operation. March 19, 1904. Liver small and hob-nailed; spleen large. Talma operation.

After History. Required tapping and again filled up. Condition on discharge: unrelieved by local doctor on April 31. Death on May 9, 1904; reported by brother.

Massachusetts General Hospital, West Surgical Records, vol. 461, p. 209.

[1] That this is probably so, this very case goes to prove; for since this paper was written and read, Mrs. W. has come to me again. There is now considerable ascites. The general condition is not as good as it was at the last report. The abdomen was full of fluid, and I removed by tapping a bucketful.

Mary W., aged forty-four years, married, housework. Admitted April 14, 1904.

History. Increasing size of abdomen for one year. Increasing weakness for one year. No severe pain, no vomiting.

Physical Examination. Considerable fluid. Liver, fifth rib to two fingers below margin.

Operation. April 16, 1904. Talma.

After History. Discharged unrelieved, with fluid in the abdomen, on May 9, 1904. I saw this patient often during the next six years. The fluid entirely disappeared, and the patient was practically a well woman. In March, 1910, the fluid began to return. I then found a slight amount of fluid in the abdomen, with an umbilical hernia. This fluid increased in amount until it became excessive. I tapped this patient on October 21, 1910. When the abdomen was empty nothing abnormal could be felt. For practically six years this woman was completely relieved of her ascites.

West Surgical Records, vol. 545, p. 121.

John V., farmer, aged thirty-one years, single. Service of Dr. M. H. Richardson.

Diagnosis. Cirrhosis of liver.

Family History. Negative.

Personal History. Not remarkable; habits good; does not use alcohol.

Present Illness. Ascites for four months; shortness of breath; loss of strength. Edema of legs for three or four weeks. Umbilical hernia, comes simultaneously with abdominal distention. Tapped three weeks before entrance; three quarts serous fluid obtained.

Physical Examination. W. D. N.; cyanotic man.

Heart. Not enlarged; cystolic murmur transmitted to axilla. Sound all over precardia, first sound apex muffled; second clear and snapping. Liver margin not felt; dulness obscured by ascites.

Abdomen. Distended and tense, shifting dulness in flanks; no tenderness; spleen palpable and enlarged; no increased

masses felt. Small umbilical hernia. Fluid more. Slight edema of legs, otherwise physically not remarkable.

Operation. By Dr. M. H. Richardson. Omentopexy. At operation escape of much clear fluid (straw-colored). Left kidney normal. Right, small and atrophied. Spleen much enlarged, smooth, bluish. Liver small, edge somewhat hob-nailed. Seen by Dr. Whitney, who diagnosticated cirrhosis. Omentum sewed to peritoneum. Uneventful recovery.

Discharged, unrelieved by operation, with ascites increasing. Has not been heard from since.

Massachusetts General Hospital, West Surgical Records, vol. 611, p. 279. October 20, 1908.

Charles M., aged thirty-nine years, dentist.

Family history and patient's history, negative.

Habits. Tobacco and alcohol, considerable for eight years. Whisky, an ounce and a half for two years daily.

Present Illness. Two and one-half months before entrance, began to swell at waist. Four weeks later five quarts of clear yellow fluid removed by tapping from abdomen. Cannot work. Tapped four times since above with same quantity removed each time. Feet not swollen. No pain. No dyspnea. No urinary difficulty.

Physical Examination. Skin, mucous membrane, eyes, mouth, and throat, present nothing suggestive. Few glands in cervical, axillary, and inguinal regions. Heart area normal. Radials sclerosed. Lungs, not suggestive.

Abdomen. Prominent, soft. No masses or tenderness. Shifting dulness in flanks; fluid wave.

Liver. Upper dulness at fourth rib. Lower border not determined.

Spleen. Not felt. Slight edema of ankles.

Diagnosis. Cirrhosis of the liver with ascites.

Operation. Omentopexy. Records state that liver at operation was found of "small type."

Note. One year later, November 24, 1909, examined by Dr. M. H. Richardson. "No return of symptoms;" scar solid. Looks and feels well. April 25, 1910, no recurrence; well.

The next and last case is not one of my own operations, but the patient was under my care during the summer of 1909. In this case I had the opportunity of studying the satisfactory results of the operation, which was performed by Dr. Stuart of the Brooklyn Hospital. Dr. Stuart informed me that the case was undoubtedly one of cirrhosis of the liver with ascites. He performed the Talma operation in Brooklyn on October 30, 1908.

The diagnosis lay tubercular peritonitis and the ascites of a cirrhotic liver.

The patient recovered from the operation without complication.

In the history of this case there was no alcoholic habit; tobacco was used in moderation. The patient had always been a clean and temperate man. At the time of the operation the spleen was enlarged.

In June, 1909, when I first saw this patient, he was so well that it was hard to believe that he had had cirrhosis. Besides a perfect operative scar, there were no signs whatever. At this time the blood showed nothing remarkable. There was nothing abnormal to be felt in the liver or in the spleen or in the abdomen.

I had the care of this patient all through the summer for various symptoms not connected with the operation, but which possibly may have been the result of the condition of the liver and spleen. He was treated by Dr. Richard Cabot for certain medical symptoms, and by Dr. Garland for nosebleed. When I saw him last he was in perfect condition.

I felt in this case, as I felt in my own cases, so incredulous about the beneficent influence of this operation upon the cirrhotic ascites, that I took exceeding pains to make sure of the patient's condition; and, as in my other cases, there

was no doubt whatsoever about the total disappearance of the ascites.

My particular attention was called to the real value of omentopexy for ascites long after I had performed the operation—upon the request of a colleague—and had forgotten it. I suppose I did not have enough faith in it even to inquire the results. When my colleague, Dr. F. C. Shattuck, one day assured me that the operation had proved a complete success, I was sure that there had been a mistake, and that some other surgeon had performed the operation. I have never been able to find out what this case was, and where the operation was performed. It is quite likely that Dr. Shattuck was mistaken.

Be that as it may, the procedure had always seemed to me devoid of common sense—sound, perhaps, in theory, but absurd in practice. It was an operation with just enough reason in it to satisfy the tender conscience of an honest man afflicted with the *furor operandi.* In treating the ascites of cirrhosis, it was to be regarded as a method which physicians and surgeons whose opinions carry weight ought to be extremely chary in recommending, lest they encourage the mania for useless operating. But when I present candidly to my own conscience and intelligence the results of this operation—to myself, a skeptic and a scoffer —what can I do but admit that this operation is successful beyond all the average in conditions that present so discouraging an outlook to medical and surgical treatment as the ascites of hepatic cirrhosis?

Before discussing further omentopexy and its indications, I will say a word about the pathological conditions for which it may be undertaken.

We must remember, of course, that the condition of chronic interstitial hepatitis, or cirrhosis of the liver, is the disease, and that ascites is merely a symptom. Operation, then, for the relief of ascites, is but a device for the relief of a symptom—like an operation for the relief of edema of

the feet and legs, in kidney disease, or of the anascarca of valvular obstruction of the heart. And, in point of fact, is not this really the case? Can we in theory expect the least relief to the hepatic lesion itself when we overcome by omentopexy that obstruction to the portal circulation that results in ascites? Is there any reasonable expectation of benefitting the real condition of interstitial proliferation and ascinal obstruction?

To put the matter as plainly as I can in the case of Dr. M., here was a man filled for years with alcohol, until he presented the gin-drinker's liver in the most aggravated, distressful, and hopeless form. I do not believe that I should have undertaken the operation but for the assurance just mentioned of Dr. Shattuck that I had previously relieved a patient of his under similar circumstances. Even after Dr. Shattuck's repeated assurance, I could not but think that he was mistaken, for I was totally unaware of any such good work on my part, and one surely is not often disposed to dispute his own success. But, in spite of this encouragement, Dr. M.'s case was too bad for operation to be considered, except as a straw to a drowning man. Although the operation was performed in fear of death upon the table, he sustained it well. Convalescence was not even eventful; it was simple, straight-forward, and speedy. The patient left the hospital, and I supposed that he had died long ago. On the contrary, he became perfectly well, and has remained so. He is able now to attend to his practice, and, as far as he or his wife knows, he is, as I say, completely cured.

Now what can a doubting Thomas say to that? Perhaps the disease was not cirrhosis, though at the time of the operation, with the liver in my hands, I thought that it was. But, whatever it was, the cure is complete; and this fact, with the others that I bring here today, have made upon me a very strong impression. I need hardly say that in the ascites of cirrhosis I feel that we have not a bare possibility

of temporary benefit, but an encouraging possibility of years of good health. I feel that omentopexy—while I may have been unusually lucky with it—is of real value in surgical therapeutics. And, finally, I feel convinced that my objections, both in theory and in practice, have been overcome, and that I shall hereafter, in these distressing cases, operate with a feeling of encouragement in my measures rather than discouragement. Not that I would, without full explanation, advise any operation in which I had no real confidence, even if it was based upon good theory; but, as I now feel about this operation, I would advise it as one well based upon good theory, and as one sufficiently practiced to show real efficacy. I cannot believe, however, that we are going to get any considerable percentage of such cures as in the cases that I have reported today.

I do not intend to consider in any great detail the diagnosis of abdominal conditions indicating omentopexy; but here, and at all times, I deem it important, in the consideration of indications for operations in a disease like cirrhosis of the liver, to discuss the possibilities of error in diagnosis. It would seem—would it not—easy to make a positive diagnosis of cirrhosis of the liver? Is it always easy, and is the diagnosis so precise that no room for serious error remains? I will not consider the possibility of errors in the history, errors in physical examinations, and errors in reasoning; but I will admit them all. I will even emphasize the frequency of their occurrence. The evidence upon which I base the statement that the diagnosis of cirrhosis of the liver is open to serious possibilities of mistake is wholly that of experience. Without searching through my records to find a number of cases of mistaken diagnosis, I can recall a case that I saw many years ago in Dorchester, in which the diagnosis of cirrhosis of the liver was made by a very eminent professor of medicine. It seemed to me, for some reason, that the case was one of ovarian cyst. I acted upon this diagnosis, advised operation, and removed from a young

girl an enormous ovarian cyst which filled the abdominal cavity so completely with its thin contents as to give to the touch the sensation of simple ascites.

It is idle to say that one can always distinguish between ascites and ovarian cyst by the varying forms of dulness. There are cases in which it is impossible. There are cases of ascites in which there is no central anterior tympany, but in which there is lateral. There are cases of ovarian cyst in which there is anterior tympany and the absence of tympany in the flanks. In a word, there are anomalous physical symptoms, and there are anomalous symptoms in the history. The really great diagnostician must take into account these rare exceptions to the rule. In this case of the young girl in Dorchester that I have mentioned, I happened to be right. It was only two weeks ago that I made a positive diagnosis of unilateral ovarian cyst in the case of a patient of Dr. Edward Richardson's. The woman was desperately sick; but I felt sure that a quick operation would enable Dr. Richardson to remove successfully what I felt convinced was a non-adherent, simple, single ovarian cyst. The case proved to be one of cirrhosis of the liver with ascites.

Many years ago, at the Massachusetts General Hospital, under the diagnosis of ovarian cyst, I operated on a young girl, and found cirrhosis of the liver. There have been other instances in which ascites has been diagnosticated as ovarian cyst, and other instances in which ovarian cysts have been diagnosticated as ascites—by myself, I mean.

We have, therefore, as an indication for operation under all diagnosis of ascites from hepatic cirrhosis, the possibility of an ovarian tumor or other easily remedied pathological lesion. This is perhaps, the first indication—that of error—and this indication is seen in all cases in which the diagnosis of hepatic cirrhosis is positive. There is, therefore, the possibility of some easily and effectively removed cause. Failing to find that fortunate error in diagnosis, we have

remaining the ascites itself and the practicability of a rapid adhesion-formation operation between the omentum and the abdominal wall.

I do not mean to say that the diagnosis of cirrhosis of the liver is so difficult that it cannot be made practically impregnable. I believe that it can, especially in patients in whom tapping has been practiced. The ascitic fluid of cirrhosis ought to permit, in the laboratory, a positive demonstration. In order to avoid the error of operating upon conditions too far developed for a reasonable hope from omentopexy, it would perhaps be always well to take a small portion of the fluid either after complete tapping or through a fine needle. This specimen can be sent for laboratory confirmation of the diagnosis.

The next indication, and perhaps the most positive indication for operation in cirrhosis of the liver with ascites, is the absence of contraindications. I ought perhaps to consider only the contraindications, and to say that in the absence of any positive contraindications to this operation, it should, through the prognosis as demonstrated at the present time, be performed in all cases. A positive contraindication to the operation would be found in condition of the heart, lungs, or kidneys making the procedure unduly hazardous. In simple, uncomplicated cirrhosis of the liver, the operation is not, I think, one of any particular risk. The operation, as I have performed it, has been swift and safe.

The contraindications to the operation on the ground of danger are seen in the mortality from the operation itself, or in complications of the operation or of convalescence, or in unpleasant sequelæ. In the four operations which I have performed there has been no mortality. In the subsequent history—during convalescence and in after years—there have been no disadvantages, either in hernias, in the adhesions themselves, or in other things.

It is fair to state, therefore, I think, that there are no

contraindications to this operation in the mortality, in the complications, or in the after results. It does not follow, of course, that all cases will succeed, or that a large percentage will succeed; but if one patient in five, or two in five, or 50 per cent., are relieved of this distressing symptom of ascites, then the end results after this operation are good enough to be strong indications for the operation.

In considering the indications for operation, we must remember that these are desperate and hopeless cases, and we naturally expect a desperate operation and a large mortality; but the results show that the operations are not desperate and the mortality is not large. The operation is certainly a quick one, there is little if any hemorrhage, and, except for the patient's depressed general condition, there is no reason why this operation should be much more dangerous than a simple exploratory laparotomy.

In reviewing these cases of cirrhosis of the liver, as I have seen them, there are many instances in which the patients come to the attention of the surgeon so late that the conditions are truly forbidding.

In considering the contraindications of a really forbidding mortality, the surgeon must remember that it is impossible always to predict. In the most desperate abdominal cases the results sometimes prove wonderfully satisfactory, whereas in some encouraging cases the results are grave out of all proportion to the severity of the operation. In a word, in considering operation, one must use common sense. I should consider that the operation of omentopexy in a patient with anasarca, with a poor heart, with a condition of impending death, would be one of folly. In such cases, the part of wisdom would be to try to improve the condition by medical treatment, to tap frequently, to increase the patient's strength. It is, of course, understood that the patient to be operated upon is in fair condition. It will not do for the physician to keep his patient until she is *in extremis*, and then send for the surgeon, as used to be the rule in appen-

dicitis. If this operation is to do any good, physicians must send patients to the surgeon early in the disease.

The operation of omentopexy is a perfectly simple one, the principle being, of course, to effect communication between the portal system of veins and the veins of the ab dominal wall. As the omentum is filled with radicles of the portal vein and is freely movable, it presents the best surface for the attachment of these veins. I bring down to one side or the other of the incision perhaps six or eight inches (in length) of omentum, and stitch it to the abdominal wall by catgut sutures or silk sutures in such a way as to bring broad omental surfaces against broad peritoneal surfaces. With a large omentum one can bring many square inches of omental surface and peritoneal surface together. The success of the operation depends, of course, upon the freedom of circulation between the portal system and the system of epigastric veins. My experience would lead me to say that, in the adhesion of the omentum to fibroid tumors and to ovarian tumors, if the free circulation between these surfaces permits its development, if the blood supply through the usual channels has been impeded, nature will establish collateral circulation with greater rapidity than if the circulation through the pedicle were unimpeded. I take this to be a fact; but I have no means of demonstrating it. As I say, I have seen very large veins and arteries passing between the great omentum and a large ovarian or uterine tumor. The amount of circulation between these two systems must be great. I have had no opportunity of demonstrating the size and number of veins and arteries that this operation causes to appear.

As in all abdominal cases, it is a good plan, when the incision is large enough, to pass the hand rapidly over the chief abdominal viscera, to see that they are in good condition, and that no error in diagnosis is being made.

What is to be gained by omentopexy? To answer this question we must consider, on the one hand, the discomforts

and dangers of excessive ascites and its treatment by tapping; on the other hand, the dangers of omentopexy, its failures and its necessarily limited good, and the comparatively brief period of relief from ascites which at best the operation may afford.

In the consideration of these points in the order of their importance to the patient, the first is the last one mentioned —the period of relief which the operation may at its best afford.

I am not able to give as complete results from my operations, or from the operations of the others, as I should like; but, in those cases which I have examined and watched, there is undoubtedly a field for the employment of this procedure. And, as I have said, my conversion to the advocacy of this treatment has been in spite of downright, and, it seemed to me, justifiable opposition to the measure.

I regard remote results as more important than immediate ones, because there is so little of enjoyable life in a case of rapidly recurring ascites. The operation, even if fatal, takes from the patient but little; while, if successful, it adds very materially to life's sum total of enjoyment.

There is this objection, with which, however, we can have but little to do: that, with the recovery from the ascites, will remain the cause in the liver, and probably the cause in the patient's habits. Be that as it may, the cure of ascites, whatever becomes of its cause, seems to me well worth the attempt as far as any objections of this kind are concerned.

DISCUSSION

Dr. James E. Moore, of Minneapolis.—I am very glad to have heard this paper by Dr. Richardson, as my experience has been exactly in accord with his. I was extremely skeptical as to the results. I have performed the operation six or seven times since, and in not a single instance have I regreted doing so. It would seem that the doubt in the doctor's mind concerning the diagnosis can be easily cleared up, because a small incision through the abdominal wall is no more serious an under-

taking than tapping the patient. By making a small opening you can see the cyst wall come up, if it is a cyst, and proceed accordingly.

So far as the after-effects are concerned, we understand it is useless in this, as well as in any other surgical undertaking, to operate upon a moribund patient. Taking a patient who is fit for operation, the only danger would be hernia. I am sure, if we submit this question to the patient, whether he would rather be alive with a ventral hernia, or dead without one, he would choose to live.

I am pleased to indorse Dr. Richardson's recommendation. I shall in the future perform the operation whenever the condition of the patient seems to justify it.

Dr. F. W. Parham, of New Orleans.—I think the procedure which has been suggested by Narath is one which is so simple that it may be performed in cases where we would hesitate to carry out the more complicated and more extensive procedure of Talma or Morrison, or some of the other modifications. Briefly, the procedure of Narath consists in making a median incision which may be used for diagnostic purposes above the umbilicus, drawing out the omentum, and stitching a certain amount of it in between the muscle and skin. Narath states that in the course of a few weeks the development of the abdominal veins in connection with this, reinforced by the vessels from the attached omentum, is very marked, showing that there has been established there, very probably, an anastomosis between the two circulations. This operation can be done under cocaine anesthesia, and we may, therefore, do it in cases where we would hesitate on account of the risk in doing a more extensive operation within the abdominal cavity. It may be done in two or three sittings, a portion of the omentum may be brought up at one time through the incision, the operation being done under cocaine, and at another time another portion of omentum may be brought up at another point.

I think the suggestion made by Dr. Dock, that if we would resort more frequently to opening the abdominal cavity instead of simply tapping, in many of these cases we might ascertain the real nature of the case, and at once carry out this simple procedure of Narath at a time when it would be more beneficial than in the later stages of cirrhosis of the liver.

Dr. Robert T. Morris, of New York City.—We must be extremely careful about our asepsis in operating on these cases. The lymph current is toward the peritoneal cavity instead of away from it; therefore, the patient loses that feature of protection. I have had good results in 2 cases operated upon early by the old Talma operation. I have had indifferent results in 8 other cases, and 2 patients died from sepsis.

Dr. H. H. Grant, of Louisville.—I wish to mention one case that has been already reported, in which there was no question as to the diagnosis. The patient was a man, who was a chronic drinker, whose trouble began with an acute attack of intestinal hemorrhage which continued for thirty-six hours, and almost carried him off. He had marked ascites afterward, probably some before. He was tapped five times in about six weeks, preceding the operation, and a large amount of fluid was removed each time. The operation was done over a year and a half ago, and the case was reported to the Jefferson County Medical Society of Kentucky a little over a year ago. A median incision was made, and the end of the omentum was picked up and carried up as high as I could get it, and stitched to the parietal peritoneum. The surfaces of the parietal peritoneum on both sides were rubbed with pieces of gauze to freshen them. This man never required any tapping afterward. Of course, tapping is not necessary at the time of the operation, because the fluid escapes through the incision. He made an excellent recovery, and at the present time, now a year and a half after the operation, he is back at his work, and has had no symptoms whatever of the return of the ascites. His liver was considerably enlarged and hardened, and while it did not present the hobnail condition, unquestionably it could be only a cirrhosis, for it could not have been malignant disease, or the patient would have been dead before this.

The point made by Dr. Morris that this operation must be done early is an important one. If changes have taken place in the liver to such an extent as to produce a fibroid condition, the circulation is so impaired that it is perhaps difficult to re-establish it, and structural changes will interfere more with the processes of the establishment of the circulation through the mesenteric vessels than actual passive condition of the liver in the early stages; and I believe that Dr. Richardson is entirely too modest in his prognostication, and that the paper he has presented to us here, if made a little more emphatic, would do us more good than it would possibly do because of his modesty. We know that Dr. Richardson is prone to take the pessimistic view of his own efforts, and he will probably go to work with renewed courage because of the recognition that has been given him on the advisability of the operation.

Dr. R. E. Fort, of Nashville.—Following the suggestion of Drummond, in 1902 I did my first operation of this character. It was an early case in which there was marked cirrhosis of the liver, and the operation was done under local cocaine anesthesia. I believe these operations should be done either under spinal analgesia or local cocaine anesthesia. I think a general anesthetic in cases of cirrhosis of the liver is dangerous, and it ought to

be excluded. The only thing I did which is at variance with the gentlemen who have spoken is, that I have made my incision external to the right rectus muscle, half way between the costal margin and the umbilicus, and the omentum was brought up, and the external portion of the fascia of the rectus muscle was removed, and a fan-shaped process of the omentum was stitched with catgut there, and this patient made an excellent recovery, and three years afterward was entirely well.

The other case was one of advanced hypertrophic cirrhosis. This patient was given a general anesthetic, and while he recovered from the anesthesia, I would not advise its use again. The patient did very well for a few months, but died at the end of six months. In a hopeless condition of this kind, where something has to be done, I think any young man would rather live with a ventral hernia than die without it. The more we work with this operation, I think the more we will find it has a field of usefulness; and I, for one, wish to thank Dr. Richardson for bringing this paper before the Association.

Dr. Samuel J. Mixter, of Boston.—In two cases I have seen, the omentum has been heavily loaded with fat. In other words, these were fairly early cases where emaciation had not taken place. In these it is difficult sometimes to stitch the omentum to the abdominal wall, for the reason that the omentum is friable and heavy. In two cases, therefore, I was satisfied with simply rubbing with dry gauze the parietal peritoneum, and the surface of the omentum, so far as possible, and the upper surface of the liver, so that after the fluid was drained off and mopped out, the rubbing was kept up until there was a little oozing. In one of these cases, in which I was able to follow the results, the result was just as good as though stitching had been done. That would apply to those cases where the omentum is sufficiently heavy.

Dr. Alexander Hugh Ferguson, of Chicago.—I have had five of these cases, and they all came rather late. The operation benefited all of them, but none lived longer than nine months after the operation.

I would like to say a word or two about the technique of the operation. In my first three cases I did as has been recommended by Dr. Richardson. In my next two cases I operated as follows: I took the omentum through the abdominal wall in three places and stitched it underneath the skin, the object being to get as close as possible to the internal mammary vessels, to the intercostal vessels, to the deep epigastric vessels, and to the superficial epigastric vessels. In this way you will reach all the vessels that terminate in this region toward the abdominal wall, and obtain extensive anastomoses.

Dr. Rudolph Matas, of New Orleans.—I am one of those who are optimistic in regard to the value of omentopexy for the relief of cirrhosis of the liver. I believe, with Dr. Richardson, that many of us who have been pessimistic and ultra-conservative in years past, now realize that omentopexy, properly applied, has become a valuable addition to our resources in the treatment of this disease. I also believe that the success of the operation depends largely upon the type of cirrhosis we are dealing with, and upon the technique that is adopted.

As Dr. Parham has said, if omentopexy is to be performed at all, preference should be given to the operation devised by Narath (of Heidelberg), which is a decided modification and improvement on the Talma operation, as the procedure is of the simplest sort and can be carried out in almost every case with the help of local anesthesia. We are especially indebted to Dr. Eugene R. Corson, of Savannah, Ga., for prominently bringing the merits of Narath's operation to the notice of the surgeons of this country, in an excellent article which appeared in the *Annals of Surgery* for 1907.

I have performed this operation three times, and while I cannot say that the cirrhosis was cured in every case, I can assert that the ascites was always absolutely relieved. In one case the patient was dry for a year and a half; in another, for six months; and in another, the latest case, for six weeks; in none of these cases was tapping required after the operation. In all, only local anesthesia by massive infiltration with β-eucain (2 per cent.) adrenalin solution was required, preceded by a hypodermic injection of morphine.

I was discouraged in my earlier surgical attempts to relieve cirrhotic ascites by the bad results which followed a Talma operation for biliary cirrhosis of the Hanot type. In this case the operation was followed by marked peritoneal reaction, hepatic intoxication, and death in coma. It is different when we operate for the more common type of ascites due to atrophic cirrhosis of the Laennecian type. In every case of cirrhosis the dangers of hepatic insufficiency must never be overlooked. It is important to irritate the peritoneum as little as possible, and to provide a provisional outlet for the rapid re-accumulation which is certain to follow any extensive manipulation of the peritoneum or the abdominal viscera. Apart from the risks of inducing an excessive peritoneal reaction which cannot be safely eliminated by a blocked and replete portal system, it is not reasonable to expect that the new anastomosis between the omental veins and the extraperitoneal venous vessels will be formed as readily inside of the peritoneum as in the extraperitoneal and subcutaneous tissues, when the omentum is extraperitonealized and brought in direct contact with parietal

venous collaterals. It is a mistake to work on the inner surface of the peritoneum, or to attempt to create adhesions by rubbing the parietal peritoneum, or stitching the omentum to its inner surface. All that is required, as Narath has shown, is to make an incision large enough to permit a mass of the omentum to be extraperitonealized and anchored in a subcutaneous pocket immediately outside of the external oblique aponeurosis; the omentum may also be anchored in the preperitoneal connective tissue, but the former is the easier and equally effective prodecure. The Narath operation offers three advantages in addition to its extreme simplicity: (1) If the incision is made on a level, or about the level, of the umbilicus—without suturing the opening too closely or any more than is necessary to prevent intestinal hernia—secondary drainage of the ascitic fluid is sure to follow through this fenestrum in the abdominal wall, sufficiently to relieve the intra-abdominal pressure during the period required for the establishment of a new anastomotic communication between the omental and the parietal veins. (2) At the end of three or four weeks the new veins form, and a distinct anatomical outlet relieves the portal plethora. (3) It is possible, if the views of certain opotherapists are correct, that the free drainage of the ascitic fluid into the subcutaneous tissues may have some curative effect on the cirrhosis—if this is caused by some specific infection. On this point I would not venture too far, but of one thing we may be satisfied, and that is, that if new veins are formed in the abdominal wall as fast and as certainly as they are regenerated in the lower limbs after extirpation of varices, there can be no doubt that the establishment of a new anastomotic route for the portal veins by omentopexy is a most reasonable expectation.

Dr. Joseph A. Danna, of New Orleans.—My first experience with this operation was while I was an interne in the Charity Hospital. Dr. Bloom, a member of this Association, did the operation on a man who was tremendously ascitic, and his abdomen was just as tense as it could be. The operation, from an anatomical standpoint, was a perfect success, but the man died at the end of two weeks. At the end of two weeks a comatose condition developed, a condition resembling very much the uremic state. After he died we held an autopsy, and we found that the anatomic result was fine; that the veins and arteries anastomosed from the abdominal wall to the omentum that had been sutured to the abdominal wall, and you could see them plainly with the naked eye.

I afterward had two cases, and both terminated fatally. The patients died in a comatose state, but in no one of the three cases was the patient tapped before operation. I began to think the matter over, and came to the conclusion that the

discussion yesterday brought out an important point in discussing the tapping of large ovarian cysts before operation. I thought that if I had tapped my patient beforehand, the patient would have gotten along better. So the next case I had I tapped the patient, and recovery followed.

There is one point I would like to emphasize, and that is, the medical man should be encouraged in sending these cases of ascites to the surgeon sooner than he has done, because I have seen cases that were diagnosticated ascites or cirrhosis of the liver that turned out to be something else. I recall a case of tubercular peritonitis that was operated on and recovered that came into the hospital with a diagnosis of ascites with cirrhosis of the liver. I recall several cases of tabes mesenterica. I have in mind one case of a young woman, with a malignant growth of one ovary, and the removal of that small malignant growth of the ovary has cured the ascites, although she was tapped eight times within three months before she came into the hospital. I believe we ought to do an exploratory operation in these cases of ascites, and we ought to do it early, but before we operate on them we should tap our patients a day or so beforehand.

Dr. Richardson (closing).—My object in bringing this subject before you was to elicit just such a discussion as this paper has brought out. In the last twenty-five years I have heard discussed in associations like this the important surgical problems of the day. As a means of judging their value and as an indication for their adoption, such a discussion by men of prominence throughout the country is of inestimable value. I do not suppose it makes much difference just how the details of this operation are carried out, but the wisdom of the principle seems of the greatest importance. To me the most important thing in these cases was the unexpected recovery that followed an operation I had very little faith in; and I wanted very much to present these recoveries before a jury of experienced men, to learn what they think of the method, and to be sure that I was not being influenced by an extraordinary series of recoveries —by coincidences rather than by downright results dependent upon reasonable causes. I was afraid, gentlemen, that I should be too enthusiastic regarding this operation; and I would again caution everybody here who has not tried this operation lest he be disappointed in it. I myself feel justified in the hope that we may relieve some, at least, of the patients who are suffering from this distressing condition, especially as the operation is simple and safe of accomplishment. The general trend of the discussion seems favorable to the procedure, and I shall, therefore, whenever possible, apply the method to suitable cases with renewed hope.

When we test new methods of operative treatment, especially in discouraging or hitherto hopeless diseases, we are too much inclined, I think, to be carried away by temporary, even doubtful, improvements; and we get hypnotized as to our results. My patients have improved after this operation to such an extent that I am on my guard lest I feel myself unduly encouraged. Although there seem to be enough successes to make the method worth while, we must not be too sanguine or too enthusiastic over it.

While I have had five or six patients in whom I have resorted to this operation, that number is much too small to justify any positive conclusions. It is the accumulated experience of a large body of men like this that counts; and deductions based upon such evidence are only the reliable guides for future action.

SOME SUGGESTIONS RELATIVE TO THE PREPARATORY, OPERATIVE, AND POSTOPERATIVE TREATMENT OF CASES OF ACUTE INTESTINAL OBSTRUCTION

By John Young Brown, M.D.
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An analysis of the records of 59 cases of acute intestinal (mechanical) obstruction coming under the care of the writer, with the view of ascertaining the treatment received in each case prior to operation, and the bearing this treatment had on the mortality, has convinced him that the general profession has yet to appreciate "that acute intestinal block is one of the gravest and most disastrous surgical emergencies," and that the outcome of a given case depends largely upon the time elapsing between the development of the condition and its relief by surgical interference. Of the 59 cases here recorded, 27 required primary resections for gangrenous bowel. All of these cases, save one, resulted from strangulations due to hernia; the exception being due to a gangrenous intussusception. Of these 27 cases, 5 died, giving a mortality of a little over 20 per cent. In 12 cases the formation of an artificial anus was necessary. Three of these were for strangulated umbilical hernia, 4 for strangulated inguinal hernia, and 5 were for acute obstructions, due to malignancy. Of these 12 cases, 6 died, giving a mortality of 50 per cent. Twenty cases of strangulated inguinal hernia, in which the contents of the sac was such that it could be returned to the abdomen, resulted in the loss of

one case, a mortality of 5 per cent. The total mortality in the 59 cases was a little over 20 per cent., a mortality entirely too high and largely due to conditions avoidable.

The history of each case without a single exception showed that temporizing methods were resorted to prior to operation. To illustrate, let me briefly relate the history of two cases selected at random from the list. Mrs. T., aged forty-nine years, was admitted to the hospital suffering from a huge strangulated umbilical hernia. Fifty-two hours before admission she was suddenly seized with violent pain in her abdomen, and her hernia, which hitherto she could easily reduce, became irreducible. Strangulation rapidly set in. A physician was called, He immediately gave her a hypodermic, and made forcible efforts to reduce the hernia. Failing in this, castor oil was prescribed and a poultice was placed on the hernia. At a subsequent visit renewed efforts at reduction were attempted and morphine was again administered. She grew gradually worse, and when received at the hospital she was toxic, vomiting fecal matter, and in an extremely bad condition. The thin skin covering the hernial sac was blistered and necrotic. On opening the sac, a gangrenous cecum, ascending and transverse colon was found.

Miss J., a school teacher, aged twenty-four years, was brought to St. John's Hospital from an adjoining town with the following history: Three days before admission, being previously in perfect health, she was suddenly seized with violent pain in her abdomen, accompanied by vomiting and extreme shock. A physician was called, who discovered a tumor an inch to the right and slightly below the umbilicus. A diagnosis of acute intestinal obstruction due to an intussusception was made. She was given a hypodermic, castor oil, hot applications to the abdomen, and the rectum was ballooned. This treatment was repeated, the patient gradually growing worse, She was brought to the hospital on the morning of the third day in a most critical condi-

tion. On opening the abdomen, a gangrenous intussusception of the enteric variety was encountered, necessitating resection and an end-to-end anastomosis.

The histories of these two cases outline very accurately the treatment usually given to patients suffering from the condition under consideration. Should a plumber be called to treat an obstruction in the pipes of the bathroom or the kitchen, similar in character to the conditions commonly found in cases of this type, and apply the same methods of treatment, it is more than probable that the head of the household would order his arrest and request that he be sent to the psycopathic ward of some nearby institution in order that his mental condition might be looked into. That patients daily receive treatment of the character above outlined, is not to be wondered at. Almost every late text-book on surgery teaches taxis in the treatment of incarcerated and strangulated hernia. Papers are still being written on the value of inflating the bowel in the treatment of intussusception. The following I quote, verbatim, from a surgery, the pages of which are hardly dry from the press. The text was written by one of the most brilliant, conscientious, and successful operators in this country—a man who has done much to perfect modern surgical methods. In discussing the treatment of strangulated hernia under the head of taxis, he says: "Place the patient on a couch or a board, or if this cannot be obtained, take a door out of its frame and place the patient on it; then elevate the lower end of this so that it will be at an angle of about 40 degrees with the floor. Have him draw up his knees, and then manipulate the protruding portion gently, so as not to cause any injury to the intestine, remembering that the longer the strangulation has existed, the more gentle must be the manipulation. It is well to permit the patient to manipulate the hernia himself while he is in this position, because he is frequently more experienced, and consequently may be more successful than the physician. If reduction is accomplished, it is well; if not, it

is best to explain to the patient that by relaxing the muscles by the use of an anesthetic you may still be successful; but if this fails, it will become necessary to sever the circular band which prevents the reduction of the hernia." That such advice from so eminent an authority is bound to do harm, cannot be gainsaid. He advocates a procedure to be practised by others which could only prove disastrous in his own skilled hands. My personal experience has taught me that if a patient who has a reducible hernia, and this hernia suddenly becomes irreducible, and the patient cannot reduce it, a surgeon cannot without doing damage to the contents of the sac. I have seen many cases where great damage has been done by the method above described. The literature contains the records of a large number of cases where reduction has been thought to have been accomplished, the patients dying later from internal strangulation. If it is difficult at times for a surgeon to determine, with the contents of a hernial sac in front of him, whether or not he should remove or return the bowel to the peritoneal cavity, taxis is certainly a most questionable procedure.

What has been said against the application of temporizing tactics in the treatment of strangulated hernia applies with equal force to the treatment of mechanical obstruction due to other causes. I simply use the hernia cases to illustrate my meaning, as this condition gives perhaps 50 per cent. of all cases of acute intestinal block. The time has come when we, as surgeons, should accentuate the importance of relieving these patients in the early hours of their trouble. Operations undertaken at such a time are simple and satisfactory. The conditions found at late operations requiring the wide removal of gangrenous bowel, or the making of an artificial anus, demonstrate conclusively that the given patient has been neglected, and that the condition present could have been avoided had early surgery been instituted. It is, however, not the purpose of this paper to discuss the early treatment of this condition. As Munyon truly says, "The

experience of operating on a case of intestinal obstruction within the first twenty-four hours is a privilege that comes to but few surgeons." As such cases generally reach the operating table late, I wish to briefly outline the procedures which have served me well in the treatment of this most grave emergency.

"An examination into the conditions found at an operation or at an autopsy shows that in all cases two factors are at work determining the fatal issue. Of course, the first and least important is the mechanical block in the bowel, the actual obstruction. The second, and incomparably the more severe, is the septic absorption from the distended, congested, and perhaps ulcerated bowel above the place of stoppage. It will be clear, therefore, that in operating upon patients so afflicted, the relief of the mechanical obstruction is but a part, and that the smaller and less significant part, of what the surgeon must needs do." As the principles underlying the treatment of such cases are practically the same, whether the obstruction be due to an intussusception, volvulus, strangulated hernia, or other causes, I can best illustrate by describing the technique employed in the treatment of a case of gangrenous bowel due to a strangulated hernia.

Preparatory Treatment. This preparation should begin with a careful washing of the stomach. Almost invariably the stomach will be found filled with highly toxic material, the removal of which is of the greatest importance. Unless the stomach is carefully washed, there is always danger of fecal drowning. Hypodermoclysis, before and during the operation, should be given if the condition of the patient demands it.

The sac is opened in the usual way. After relieving the constriction, the bowel is gently pulled down until healthy bowel is reached. The bowel above the constriction is clamped well back into healthy tissue. The clamp is placed on the distal bowel and the bowel is cut across. A Paul's tube or

an ordinary glass drainage tube, to which a rubber hose has been attached, is immediately tied in the proximal bowel and the clamp above is removed. The gut to be removed is isolated with gauze, and while the operator ties off the mesentery, the assistant manipulates the bowel above, so that as much of the septic bowel contents as possible can be drained into the receptacle under the table while the surgeon is completing his work. By this method, no time is lost, and by the time the operator has removed the segment of gangrenous bowel the gut above will have drained an astonishing amount. The proximal bowel is again gently clamped, and the anastomosis is completed with either sutures or the button. A stab wound is made above the pubis, a drainage tube is placed in the vesicorectal pouch, and the hernial ring is closed by the method suited to the individual case. As wounds of this type are soiled wounds, it is advisable that a small drain be placed in the hernial wound.

This method of treatment is satisfactory in dealing with the inguinal varieties of hernia, but when a tightly constricted gangrenous loop of bowel is found in the femoral ring. I have found in dealing with this condition it is of great advantage to make a supplementary abdominal incision, delivering the gut through this wound. By this method wide resection can be accomplished and proper drainage of the distended bowel above instituted, a procedure which would be difficult if an attempt was made to resect at the femoral outlet. In resecting gangrenous bowel it is of the greatest importance that the resection be made wide, well back into healthy tissue. Unless this is done, leakage is apt to occur, defeating the object of the operation. I believe it far safer to resect in all cases where the vitality of the gut is in any way questionable. In the series of cases above reported there was one death due to the return of a piece of bowel into the peritoneal cavity, the vitality of which was questionable. In case the condition of the patient is such that the making of an artificial anus is mandatory, a procedure

which I have found of value in handling gangrene of the small bowel may be briefly described as follows:

As soon as the sac is opened, and the constriction is relieved, the operator determines that an artificial anus is necessary, the bowel above and below is rapidly pulled into the opening. A heavy clamp is made to perforate the mesentery at either limit of the diseased portion. The mesentery is then tightly clamped. A clamp is then placed on the distended bowel above. A similar clamp is placed below the first one, and the bowel is cut across. The bowel below is clamped in a similar manner. A rubber drainage tube is tied in both the proximal and distal ends of bowel. The gangrenous gut is quickly cut away and the clamp holds the mesentery fixed in the opening. The two tubes are tied together with a catgut suture. Gauze is then made to surround the protruding bowel and the wound is left open. By clamping the mesentery in the manner above described no time is lost, and the clamp serves the double purpose of controlling the hemorrhage and fixing the two ends of bowel in the wound. The two tubes accurately define the opening into the two ends of bowel. In a few days the clamp, gauze, and tube can be removed. The irritation of the fecal matter generally results in firm contraction of the wound, leaving the two ends of bowel firmly fixed.

The postoperative treatment in cases where resection has been done is practically the same as that which is usually given to any abdominal section—the frequent use of the stomach tube, the avoidance of morphine and strychnine, the withholding of all food by mouth, and the liberal use of normal salt solution, both under the skin and in the rectum.

DISCUSSION

Dr. J. Shelton Horsley, of Richmond.—These cases are of such great importance and require such prompt action, that the paper of Dr. Brown is peculiarly serviceable. I think Crile has

well demonstrated that what causes death in cases of strangulated hernia is not peritonitis or sepsis, because, as a rule, these patients die without perforation, and when the peritoneal fluid is examined it is shown to be sterile; but a toxin is generated in the loop of gangrenous intestine that has a powerful effect upon the cerebral cells. It has been shown experimentally that you can take two series of animals, cut off the nutrition of a section of the bowel by ligation of the veins and arteries, and if the bowel is clamped at both ends of this section, the dog will live longer than if the bowel is not clamped. I have had the point brought home to me recently in the case of a child, a few months old, that had intussusception in the country. The attending physician recognized the nature of the case promptly, but on account of geographical conditions the operation could not be performed sooner than twenty-four hours after the diagnosis had been made. Operation was performed as soon as possible, and the intussusception was reduced with difficulty. The little patient left the table in good condition considering it was only a few months old, but after leaving the table it began to develop temperature, and died with cerebral symptoms. The temperature reached 104°, and the child died six hours after the operation. If I had resected the bowel, although apparently it was not gangrenous, the child might have recovered. I believe that children are peculiarly susceptible to this toxic condition, and that we should resect the bowel in order to remove the toxins along with the loop of intestine. Even in grown people, we must remember that this toxic material should not be allowed to pass on, and we should, wherever possible, take it out just as we would virulent pus.

Dr. William H. Wathen, of Louisville.—Dr. Brown has given us a very practical paper, and it ought to teach us the lesson that timely surgical work is the most important factor in acute obstruction of the bowels, whether it be hernia or otherwise.

The past history of operations for intestinal obstruction, until within the last ten years, has been very sad, the mortality being very high. I fully agree with Dr. Brown that taxis in strangulated hernia should be very gently performed, and if we cannot, without injury to the bowel, reduce the hernia, operative procedures should be at once instituted, and the radical operation made as soon as possible to cure the hernia. We do not know in any case of hernia that cannot be reduced just how long it will require for the bowel to become gangrenous, because we cannot tell how much constriction there is cutting off the circulation. Treves emphasizes very forcibly the importance not only of an early operation, but of drainage of the proximal end of the bowel, so as to get rid of this poisonous material before

attempting the anastomosis, and also as wide a division of the bowel as possible, always going beyond the diseased area.

Dr. Brown has referred especially to the anastomosis of the small intestine and the end-to-end anastomosis. I wish to place myself on record as being positively opposed to end-to-end anastomosis in the small intestine as a routine measure, and only in the hands of very experienced operators, where the case is not at all desperate, and I believe many patients die from an end-to-end anastomosis of the small intestine who would have gotten well readily by a lateral anastomosis. Nor is it of any importance whether in making an anastomosis in the small intestine it be isoperistaltic or antiperistaltic. The gas and contents of the bowel will pass through an antiperistaltic anastomosis as well as through an isoperistaltic anastomosis, as I have noticed in my experiences, and the operation is done more quickly.

Dr. J. M. Mason, of Birmingham.—I do not think we can endorse too heartily and fully what the essayist has said in regard to purgation, not only in the form of obstruction he spoke of, but in other forms attended with intestinal paralysis.

I want to say a word in regard to the value of a life-saving, but temporary, enterostomy in a great many of these cases that come in late, that are too far gone to undergo a radical operation at once. A small rubber catheter sewed into the bowel after the method of Senn's gastrostomy, that is, folded in two or three times, can be left in a few days and taken out, and in almost every instance brings about good results.

I had a case of typhoid perforation last year of that sort, with partial intestinal obstruction following the operation. The patient was in a desperate condition. I resorted to enterostomy with use of a small catheter in the small intestine, and she recovered.

Dr. F. W. McRae, of Atlanta.—The main point in Dr. Brown's paper, if I understood it correctly, is to emphasize the bad treatment preliminary to the real treatment. I believe that is the gist of the paper. There is not a surgical teacher I know that would use taxis or inflate the bowel with water or air, or do any other thing which would call for surgical profanity, because we do feel profane when we are brought face to face with those cases in which taxis has been resorted to for three or four or eight days, the patient purged, and then have the mortality charged up against us that belongs elsewhere. I endorse Dr. Brown's statement that this is not the palce for taxis nor for inflation, but these cases call for surgical relief as soon as possible.

The next point I wish to emphasize is the value of bowel drainage as suggested by Sir Frederick Treves. According to the later advice of Crile and others, there is a great advantage in

the two-stage operation and drainage in these desperate cases. Every surgeon must elect as to whether he will do an enterostomy or a resection of the bowel, but we now know that often it is safer to drain the bowel and do a two-stage operation.

The only point I want to emphasize is that we should not let it go out from this Association that taxis, or any kind of treatment other than surgical, is proper for mechanical intestinal obstruction, whether due to external hernia or intestinal strangulation of any kind.

Dr. James E. Moore, of Minneapolis.—I wish to emphasize the point made by the last speaker. Most of us are teachers of surgery, and it is our duty to teach the rising generation of medical men that taxis has no place in modern surgery. I have taught students in the University of Minnesota for years that taxis had no place in surgery. When an obstruction of the bowel has obtained for a number of days, taxis will do no possible good, and there is great possibility of harm. If the obstruction has just recently occurred, we should avoid taxis for fear we might injure the reduced bowel and deprive the patient of the surgical intervention that he was entitled to at that time.

Dr. Brown (closing).—There is only one purpose I had in bringing this paper before this Association, and that is to accentuate what the history of these cases show, that it is a common practice for practitioners to employ temporizing tactics in the treatment of bowel obstruction. I think the reason for this is due largely to the teaching of the text-books on which they largely depend for guidance. In looking over a number of recent text-books, I have been surprised to find that, almost without exception, they urge the methods of delay. The text-book from which I quoted has not been out of the press more than two weeks. The general practitioner of medicine is, therefore, to be excused for practising methods of this type when taught to do so by the text-books.

In regard to the point brought out by Dr. Wathen as to the advantage of lateral anastomosis over end-to-end anastomosis, I do not agree with him. We can do an end-to-end anastomosis quicker than a lateral anastomosis, and I do not see any reason why we should not follow that method in restoring intestinal continuity. Every operation that has deviated from the normal anatomical architecture has been wrong. The Almighty evidently intended that end-to-end anastomosis should be made wherever possible, and I think we will not fail in following such teaching. In doing a lateral anastomosis we close the two ends of the bowel, and then make the union with the clamp or with the suture. I have had quite a large experience with the use of the Murphy button in end-to-end anastomosis, and my experience has been very satisfactory. Some years ago I

showed a specimen in which two anastomoses were made for resections due to gunshot injuries, one having been made with the Murphy button, and the other with the Connell suture, and the patient died six months after the operation from tuberculosis, and the specimen showed that there was absolutely no diaphragm where the Murphy button was used, but there was a distinct diaphragm where the Connell suture was used. It is true, I use the button much less than I formerly did, but I do not get the type of cases I used to get. In gunshot injuries, in work of this type, where a quick and reliable anastomosis has to be made, I do not know of any method more valuable, and that has done more to improve the technique of intestinal surgery. I have never had the button retained except in the stomach in one case, but in the small intestine I have never had it retained.

FURTHER OBSERVATIONS ON CYSTS OF THE PANCREAS

By Rufus B. Hall, M.D.
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Cysts of the pancreas are so infrequent that it is desirable to place every case on record, and, in doing so, even at the expense of being tedious, the important points in the clinical history of each case should be carefully noted.

While a busy operator not infrequently comes in contact with acute pancreatitis, which is becoming more easily diagnosticated than was possible a few years ago, yet the diagnosis of this condition is by no means easy. Yet the same practitioner rarely meets a large cyst of that organ.

The writer reported to this association an interesting case of cyst of the pancreas at its meeting in New Orleans in 1907. He now desires to present another case of equal interest. The anatomical location of the development of cysts of the pancreas, as well as the pathological cause, must always be a source of great anxiety to the operator. If the cyst develops in the tail of the pancreas due to trauma, or even obstruction of the duct by calculi, and the patient recovers from the operation, the patient may have enough of the gland remaining, if the duct is patulous to sustain life. If, on the other hand, the cause should be obstruction of the duct by a calculus near the head of the pancreas and the operator not be able to discover or remove the obstruction at the time of the operation, the outlook for the ultimate recovery of the patient is very grave. I will grant that the location of the obstruction is not easy to determine before the oper-

ation. Indeed, one must decide this largely by the after-development in the progress of convalescence as to this condition, which he can do by examination of the fluid discharged from the drainage tube.

The mode of formation of these large cysts is largely speculative. In the inflammatory process, following the injury or obstruction, effusion takes place in the glandular tissue of the organ. The degenerative changes lead to the formation of an adventitious wall of inflammatory material, plus the pancreatic tissue, thus forming the sac into which occasional hemorrhages occur during the progress of the disease. The contents of pancreatic cysts are varied, but usually the fluid is of a brownish red or dark green color. The fluid from the cyst is alkaline in reaction and contains albumin, fat globules, crystals of cholesterin with white and red corpuscles. The size of the pancreatic cyst varies from a small vesicle to an immense sac containing two or more gallons.

The diagnosis of pancreatic cyst is more or less obscure, and must always be a source of great anxiety to the operator and, indeed, it is difficult in many cases *even* after the operation. To confirm the diagnosis, it is necessary, in many cases, to examine the character of the fluid, which, if it is of the pancreas, will reveal the true nature of the cyst. It is a well recognized fact that tumors in the abdomen displace neighboring organs, or become attached to them, thus misleading the operator in his judgment, but, if the contents of the cyst demonstrate the presence of pancreatic fluid, and the anatomical relations are those of a pancreatic cyst, little doubt should remain as to its true nature. In a large number of reported cases, there is a history, more or less definite of an abdominal injury. In many cases the enlargement is observed soon after the injury; in others, after a long period of time has elapsed. In other instances, the development of the cyst follows some acute illness such as typhoid fever. The usual course of pancreatic cyst is comparatively

acute, a few weeks covering the entire history, but there are a few instances on record in which the cyst has been known to exist for years without causing much inconvenience until some accident to the cyst like hemorrhage or rupture of the sac, or intestinal obstruction brings the case to a sudden termination.

The subject of this report, E. B., male, aged twenty-one years, married, an iron mill worker, patient of Dr. E. M. Sellards, of Ashland, Kentucky, was admitted to the hospital on October 6, 1910. He had always enjoyed good health previous to the present attack of illness, which began suddenly nineteen weeks before admission. He gave a clinical history of having received an injury while lifting a heavy weight the day preceding his attack of pain.

While at the luncheon hour the men were showing feats of strength by lifting a large cast iron wheel, each vieing with the other to see how high he could lift it up and how long he could hold it by using both hands. Our patient said he could lift it with one hand and put it above his head, which he accomplished. Just as he did so, he said he felt something tear in the upper part of his abdomen. This caused considerable pain at the time and made him somewhat sick and faint for a few minutes. He worked half a day after that, but in the middle of the night of that day he was seized with an acute attack of pain, which the physician, who was called, believed to be an attack of gallstone colic. He received three doses of morphine hypodermically before he was relieved of the pain. The following day he did not work because of the soreness and pain in his abdomen. The second day he did work, but was unable to do the full amount of work that was usually performed. He did not work any more, and on the fifth day from his attack he had a second severe attack of pain, lasting for half a day, which required several doses of morphine to relieve him. The doctor now told him that he was mistaken about the first attack being gallstone colic. He believed now that he had

appendicitis, and that if the patient did not improve in a few hours he would operate on him. The following day his condition was better, and the doctor still believed the patient was suffering from appendicitis, but did not urge an operation. He told the patient at the time that he had general peritonitis but that he was going to get well from that attack. He was able to leave the bed in four or five days. He had his third attack of pain, which was not nearly so severe as the first and second, about three weeks after his first illness. This attack required only a couple of doses of morphine to relieve the acute pain. The abdomen was sore and tender always after his first attack. About two weeks after his third attack, making five weeks from the commencement of his illness, the patient first observed a tumor a little to the left of the middle line under the border of the ribs. The patient called the doctor's attention to this and the doctor told him he thought it was gas. This history was all obtained from the patient, as the doctor had passed out of the case soon after the tumor was first observed and another doctor assumed charge, an irregular, who treated him until Dr. Sellards was called. The patient said the tumor gradually increased in size. He noticed about that time that he was losing flesh, that he had lost perceptibly in strength, and he was not surprised in weighing himself to find that he had lost five pounds. He lost flesh rapidly from this time. His appetite failed, he could not digest his food properly and his general condition gradually grew worse until he came under the care of Dr. Sellards, a few days before he brought the patient to the writer. The patient denied that he had ever had any form of venereal diseases. He had been peculiarly exempt from all illness, even the ordinary diseases of childhood. He was foreman in an iron mill and prided himself on his physical strength. He was six feet tall and weighed when well 239½ pounds. When he entered the hospital he weighed 140½ pounds, having lost 99 pounds.

Upon examination, he was very much emaciated, his pulse was 140, his respiration 36, his temperature 98 and his physical suffering was very great. The abdomen was enormously distended. The tumor practically occupied the whole of the abdomen, but was more prominent at the upper half and larger on the left side of the middle line. It was of a peculiar shape, not unlike in size and shape of an ordinary coal bucket turned upside down and placed diagonally over the man's abdomen with the large end toward his left ilium. The cartilages of the ribs on the left side were misplaced, pushed upward and formed a shelf-like projection over the tumor. The lower part of the abdomen on the right side was not distended from a line drawn from the middle of Poupart's ligament on the left side to a point about two inches above the right anterior superior spine of the ilium. The abdomen below this line was perfectly flat. The cyst commencing here, filling the upper and left side of the abdomen was very tense and fixed in its position. By palpation, it gave the sensation to the examiner that it was a solid tumor, yet distinct fluctuation could be obtained by percussion. The weight of the cyst was so great and the patient suffered so much from the pressure that he could not be induced to lie on his back long enough to carefully examine him. He could rest more comfortably on his left side, but he could not rest long in any position. The facial expression of the patient was that of one suffering great agony. His lips were drawn over his teeth and his face was pinched. The patient had suffered from a diarrhea with three or four stools daily for about two weeks.

With the great loss of flesh, the enormous tumor in his abdomen and the complaints of the patient of the great suffering, made a pitiable picture long to be remembered. He said that the sensation to him was that the tumor was likely to burst.

In diagnosing a case like this, a number of conditions must be considered. The tumor must be one of three or four

conditions, and one must take these into consideration as well as the past history and the present condition in making a diagnosis. We must consider pancreatic cyst, enlarged spleen, postperitoneal sarcoma and tumor of the left kidney, and, by eliminating one after the other, both the clinical history combined with the physical condition, must receive careful consideration before final judgment can be reached.

The diagnosis of pancreatic cyst was arrived at by excluding the kidney and the spleen which was done without much difficulty. In elimination of the kidney, the examination of the urine revealed nothing abnormal, excepting that it contained sugar, just as it should do in cyst of the pancreas. There was no pus or blood in the urine and frequent examinations made before he came under my observation showed there had never been any pus or blood in the urine. There were no bladder symptoms.

The tumor outline in itself was so different from that of enlarged kidney one would be impressed at once that if it was not a kidney tumor, it was so out of the ordinary in shape and position. The enlargement occupied the upper left half of the abdomen. The largest part of the cyst was the upper part. Tumors of the kidney usually occupy a different position. They do not crowd upward and toward the middle line like the one under discussion. It would not displace the ribs while the lower abdomen was not yet distended.

A tumor of the spleen, as large as this one, would likely be a solid tumor. It would not occupy the same position as this tumor. It would project more downward. One would be able to outline a notch along the right border of the tumor, which did not exist in this case. The man had never suffered from malaria. He had never lived in a malarious district. The blood examination was negative.

To exclude a rapidly growing postperitoneal sarcoma was not so easy because every operator knows how easy it is to be deceived, and thinks he detects a wave of fluctuation in

those tumors, when it does not exist, that he may call a malignant tumor a cyst and only correct his diagnosis on the operating table. In this case, the patient had the clinical history of a pancreatic cyst, and many of the symptoms were accentuated. The great loss of flesh and strength, and the disgust for food of every kind were very marked. He would not have those with a postperitoneal sarcoma. In that disease the patient's appetite frequently, and in fact, almost always, remains comparatively good and the food tastes natural to him even to the last, while in pancreatic cyst it is quite the rule for the patient not only to lose his appetite, but really to detest food in any form. Therefore, I concluded that the cyst was one of the pancreas.

The operation was made on October 7, 1910, in the presence of his physician and Dr. George A. Fackler, of Cincinnati, and the hospital staff.

Under ether anesthesia, an incision three inches long was made in the rectus muscle and the tumor was found not to be adherent to the anterior abdominal wall. A large aspiration trocar was introduced and twenty-three pints of dark, almost chocolate colored, thick, heavy fluid was withdrawn, which upon analysis proved to be pancreatic fluid. The puncture in the cyst wall was enlarged a couple of inches and the cyst explored with the fingers. There were many granular feeling blood clots loose in the cyst, as well as attached to its wall, and a few as large as the finger and an inch long were removed. The cyst wall was stitched to the abdominal wall and drained. The operation was made as hurriedly as possible, and but little ether given, as it was not required after the patient was thoroughly off. The patient regained consciousness in a few minutes after he was put to bed. He rallied very slowly, and it was four hours before his temperature rose to 98°. His pulse remained from 140 to 130 for twenty-four hours.

The weight of the fluid was 24 pounds. This deducted from his weight before the operation would leave his weight at 116½ pounds, a loss of 123 pounds.

On the morning following the operation, October 8, his pulse was 120, his temperature 100°, and his general condition just the same as before the operation, but he was greatly relieved by having the weight of the cyst removed. He could lie on his back with comfort. He refused liquid nourishment, but we persuaded him to take a little albumen water several times during the day. He voided his urine. He passed flatus several times during the day. There was no drainage from the cyst.

On the third day his pulse ranged from 120 to 135 and his temperature 99° to 99.5°. He passed flatus several times during the day and had two liquid stools. We turned the patient on his side and drained a pint of fluid from the sac, the same in character and appearance as that removed at the operation. His general condition appeared better.

On the fourth day his pulse was down to 105 and his temperature 97° per rectum. He refused nourishment, he had several thin stools, and the abdomen was not distended. In the afternoon his pulse was 138 and his temperature 99°.

On the fifth day his temperature and pulse were about the same as the preceding day. The patient seemed to have lost ground in the past twenty-four hours, his intellect was clear, he was very feeble, but he could not take nourishment. He took water sparingly.

On the morning of October 12, the sixth day after operation, bile came through the wound and flooded the dressing. Bile continued to pass through the wound during his entire illness, showing conclusively that the pancreatic duct was not obstructed, permitting the bile to pass through the duct into the cyst cavity out through the drainage tube. I was very hopeful then that he might take a turn for the better, but I was doomed to disappointment. The diarrhea became so persistent that we were obliged to give him opium to control it. He required fifteen to twenty drops of tincture of opium administered every four or five hours, which checked it. The question of nourishing the patient was a serious one. Feeding him by the rectum was out of the question

from the first, and anything taken into his stomach would be ejected soon afterward. The patient would try very hard to take what he was asked to and frequently it would be ejected within a minute or so.

On the seventh day we commenced the administration by mouth of extract of pancreatis in ten-grain doses. This acted very nicely. The patient retained it in the stomach better than anything we had given him. It seemed to revive him in every way. The patient himself said it was the first medicine that he had taken that helped him and asked for more of it. The diarrhea was less persistent and required less opium to control it. By administering this remedy, we hoped the patient would be able to take some nourishment. This treatment was persisted in until the last, but after the first day or so, it seemed to loose its effect and he steadily grew worse. As the sac contracted and the patient could change his position, the fluid, which was now practically pure pancreatic juice, necessarily came in contact with the skin, keeping the parts bathed with it all of the time.

On October 15, eight days after the operation, the wound had united and the stitches were removed, but over an area as large as the two hands the skin was very red and swollen.

On October 17, over the whole area, the skin had practically disappeared, leaving a large raw surface. The fluid from the cyst had digested the skin. The patient complained more of pain from this condition than from all of his other ailments.

It is not necessary to go into detail further in the report of this case than to say that he gradually grew weaker and weaker, his pulse varied from 130 to 140, his temperature from 97° to 99°, until October 24, at 5 P.M., seventeen and one-half days after the operation, when he died of exhaustion.

I realize that the report is incomplete without an autopsy, but this was out of the question. All that I could do, I could not persuade the family to allow it.

The case was a desperate one when he entered the hos-

pital and the operation promised him the only hope he had. He made a surgical recovery and a great part of his physical sufferings were relieved. It was unfortunate that this case could not have been operated upon when the tumor was first observed about five weeks after his first attack of pain. It is more than probable that at that time his life could have been saved. The clinical history and the result after the operation sustained the belief that the cause was an injury, probably rupture of the pancreas the day before his first attack of pain.

The fact that bile regurgitated through the pancreatic duct six days after his operation demonstrates that the duct was not obstructed by a calculus, therefore we reason that if he could have been operated upon early and recovered from the operation, he might have had enough of the gland remaining to sustain life. The case emphasizes the great importance of early operation in these cases.

DISCUSSION

Dr. James A. Goggans, of Alexander City.—I do not know that I feel capable of discussing this excellent paper, as it is strictly on pancreatic cysts. I regard it as a very important subject, since we have great difficulty in knowing and in isolating and separating the diseases of the pancreas from the diseases of other organs situated thereabout, there being the end of the stomach, duodenum, gall-bladder, and head of the pancreas.

I have operated on several cases of pancreatic disease. I have had no case, however, of cysts of the pancreas except one of cystadenoma, and that patient had a tumor very nearly as large as my fist. A pathological examination was made by the pathologist of the University of Michigan, and it proved to be a cystadenoma, and it sprang from the pancreatic duct.

I wanted to speak of this, and not allow the paper to go by without some discussion, on account of the great difficulties we have, and in my opinion there are a great many patients who have pancreatic disease who go unrecognized, and die, and we never know the nature of their trouble.

I have operated on two cases of carcinoma of the head of the pancreas. One of these patients, a man, went all over the country for the purpose of getting a diagnosis of his case, and I only made a diagnosis after the pathology was removed.

CARCINOMA OF THE BREAST

By Wm. Carpenter MacCarty, M.D.
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Introduction. Time does not permit a detailed account of the literature or the presentation of all the classifications of tumors of the breast. Neither does it permit a detailed account of the clinical histories and pictures which one necessarily studies in an investigation of such a large amount of material.

I shall therefore endeavor to make clear in the time allotted me the reason for some of the confusion in the classifications and to demonstrate most of the conditions which have given rise to numerous synonyms used in describing various tumors or pathological conditions which occur in this organ.

The material for this paper consists of 700 amputated and excised breasts in the clinic of Drs. C. H. and W. J. Mayo, Rochester, Minnesota. The blocks, which had been preserved in 4 per cent. formaldehyde solution, were frozen, cut, and stained with hematoxylin and eosin. All specimens had previously been diagnosticated by means of fresh frozen sections which were stained with Unna's polychrome methylene blue. Such frozen sections can be made in from fifty seconds to two minutes, and can even be photographed in color within thirty minutes of the time the breast is removed.

Only fibro-epithelial tumors will be considered in this paper. Such conditions as simple cysts, lactoceles, dermoids, infections, and anomalies will be taken up in a future communication.

"Abnormal involution" or "senile parenchymatous hypertrophy," perhaps more descriptively and more accurately described by Koenig as "mastitis cystica chronica," is a definite condition expressed, with variations, by an increase of the interglandular tissue, in various stages of its growth, atrophy or hypertrophy of the gland groups, atrophy or hyperplasia of the epithelium of the gland units, dilatations of the acini and ducts, and small or large amounts of infiltration of the periacinar tissue by lymphocytes. This last condition is present in over 70 per cent. of the carcinomata of the breasts when they are judged simply by a few sections taken through different areas. It doubtless would be more frequent if serial sections were made.

Lymphocytic infiltration is most frequently seen in breasts containing small tumors early in development. It occurs in breasts in which no tumor is present, but in such the general picture is more that of atrophy than hypertrophy, although some areas may be hypertrophic.

The histological picture of "chronic cystic mastitis" is seen in or associated with fibro-epithelial tumors.

One of the most striking features in the study of carcinoma of the breast is the presence of small and large cysts (dilatation of acini) which occur in over 50 per cent. of the cases, when the specimens are judged solely by a few sections and not by serial sections. Only the cysts found in association with carcinoma and fibro-epithelial tumors will be considered.

Normal Adult Breast.—This organ is composed of adipose tissue, connective tissue, and epithelial tissue. The last of these, or secreting portion of the breast, is arranged anatomically into gland groups composed of from six to fifteen gland units. The gland unit or secreting unit represents the histological unit of the organ and consists of several cells sharply demarcated from the stroma and arranged around a space or lumen which may be potential or patent. In the active organ these secreting cells appar-

ently rest upon a flat row of cells which appear to be a part of the stroma. This second row of cells may be called a "basement membrane" (membrana propria).

In considering inflammatory and neoplastic conditions found in the breast, the histological structures will be spoken of as gland groups composed of gland units. The stroma will be spoken of as interacinar or periacinar connective tissue and interlobular connective tissue (between gland groups).

In the breast, which may be classified under the heading "mastitis cystica chronica" (Koenig), the gland groups vary in size and in the number of acini as well as in the condition of the gland units. The condition in the gland units may be tabulated in advancing stages, as follows:

(*a*) The cells may be small and contain a small amount of protoplasm. There may be no lumen, or a small lumen. They may be surrounded by lymphocytes. The stroma may be dense or rare. The cells may be large. A large lumen may be present. (See Fig. 1, *a* and *b*.)

(*b*) There are two rows of cells in each unit, the inner row containing oval darkly staining nuclei arranged radially around a dilated lumen, and the cells of the outer row are flat or round, the nuclei small and round. These latter cells may or may not be the cells of the "membrana propria." The periacinar connective tissue may be rare or dense and there may or may not be lymphocytes present. Acini with such characteristics may be visible to the naked eye (Fig. 1, *a*). The inner row of cells is apparently pushed toward the lumen by the development of the second or outer row. The cells of the outer row have different characteristics from the inner row, in that they are round, have clear protoplasm and sharply defined round nuclei.

These round hyperplastic cells are the "blasse Zellen" of the German writers, and were first described by Borst and Wohlseeker (Saar). Borst considered these cells specific carcinoma changes. Saar, however, says they occur in benign tumors, and that he saw them in a cystadenoma. Kurn found them in a fibro-adenoma, and in the breast of a child.

These authorities are probably all correct. "Blasse Zellen" occur in this series in fibro-adenomata, cystadenomata, and carcinoma, but this fact does not prevent them from being the cells out of which carcinoma develops.

FIG. 1.—(*a*) Represents a normal gland unit or acinus. Note: The thickened band surrounding the acini in the diagrams does not indicate a basement membrane, but the surrounding stroma. (*b*) Hyperplasia of the epithelium. (*c*) Hyperplasia of the epithelium, distention of the lumen and two rows of cells. The inner row is composed of cells with darkly staining oval nuclei and dense protoplasm; the outer row is composed of cells with round nuclei and clear protoplasm. (*d*) Hyperplasia in a stage in which the inner row of cells has disappeared, leaving only the outer row. The lumen of the unit often contains detritus of the disappearing cells of the inner row. The cells of the outer row still contain round or slightly oval nuclei which do not take stains densely. The protoplasm is clear. (*e*) Hyperplasia of the outer row after the disappearance of the inner row. (*f*) Hyperplasia of the outer row and complete filling of the lumen. (*g*) Necrosis which is not infrequently seen in association with hyperplasia. (*h*) Distended gland unit forming a cyst. The lining cells are from the outer row.

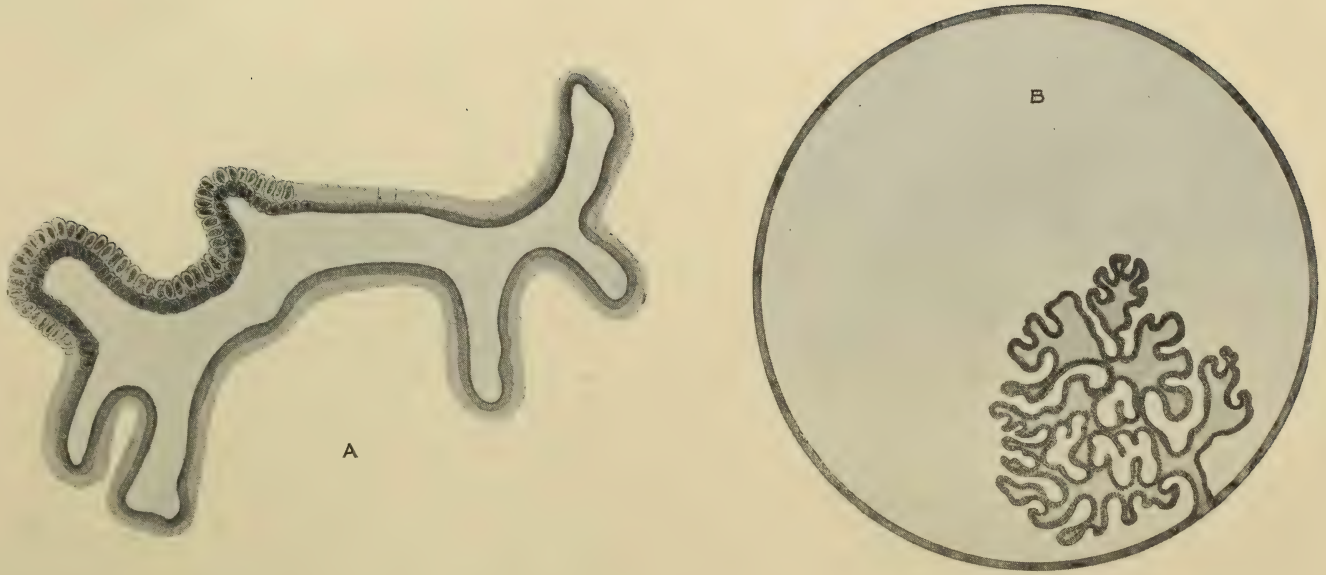

FIG. 2.—(*a*) Pseudopapillomatous cyst formed by the fusion of acini in a case of chronic cystic mastitis. Such a picture represents a gland group or a part of a group. The lining cells are arranged in two rows similarly to the hyperplasia in Fig. 1, *c*. (*b*) Papillary cyst. The cyst is lined by one layer of cells and the papilloma is covered by one layer, which is the outer row of the acinus.

Neither does it prohibit the same cells from being in stages of hyperplasia in all three of these tumors, because it is well known that fibro-adenomata and cystadenomata develop into carcinoma, and, moreover, that cystadenomata and fibro-adenomata may be synonymous, depending upon the portion of the tumor examined.

During hyperplasia of the epithelium and the formation of cysts from the acini the interacinar stroma not infrequently becomes reduced in amount and completely disappears. This destruction allows the acini to fuse and form larger cysts which, in their early development after fusion, still have the remains of partially destroyed bridges of interacinar stroma projecting into the lumen. They are covered by epithelium and form pseudopapillæ (Fig. 2, *a*).

The epithelium lining the cysts becomes hyperplastic (Fig. 1, *e*). The lumen becomes filled with growing epithelium, and the centre of such a mass of epithelium frequently becomes necrotic (Fig. 1, *f*, *g*). The condition of hyperplasia into the lumen forms the picture known as "Shimmelbusch's disease;" that in which the whole lumen is filled and the stroma is invaded presents the picture of "medullary carcinoma."

During these changes within the gland unit certain reactions in the periacinar tissue may or may not occur. These consist of an infiltration with lymphocytes and an increase in the connective tissue immediately surrounding the acini so as to form a definite ring of dense tissue which frequently undergoes hyaline changes. Such periacinar reaction is not a necessary result of hyperplasia into the lumen. Indeed, acin may be seen in the same microscopic field with and without this reaction. Interesting also is the picture not infrequently se n in which some acini are atrophic and some hyperplastic without this periacinar reaction, and others w th hyperplastic epithelium in the presence of marked periacinar reaction.

Thus far the change in the growth of the epithelium has

been spoken of as hyperplasia, with no reference to the changes in the cells themselves.

The low power microscopic pictures in the hyperplastic and neoplastic breast have been described in literature as "cystadenoma," "Schimmelbusch's disease," "maladie de Reclus," and "papillary cystadenoma."

The cells when examined under the high power are irregular in size and shape. The nuclei are likewise irregular and show mitotic figures. The condition has not been called carcinoma simply because the epithelium has not broken through the "basement membrane." Such a criterion belongs to the realm of low-power diagnosis because the morphological changes in the cells themselves may be seen to be the same whether or not the "basement membrane" is broken through. This change in the cell may be seen in cysts in which it can be demonstrated that the epithelium is breaking through the "basement membrane" and invading the stroma. The cells are identical with those in which no such change in the "basement membrane" has occurred. The nuclei vary in size and shape beyond the size and shape of normal nuclei in the resting or simple hyperplastic state.

Invasion of Stroma. How and why the cells of the outer row proliferate and pass through the "basement membrane" is not known, but the fact remains that weakened points in the "membrana propria" are seen and at such points there seems to be in some cases a confusion of tissues, large epithelial cells, low darkly staining oval cells of the "membrana propria" and oval or spindle cells of the so-called periacinar stroma. The cells of other acini extend into the stroma, and the apex of such an extension bears no trace of the "membrana propria." Lymphocytes may or may not be present at the point of invasion. At just what stage in the development of the cells invasion occurs seems to vary, at least morphologically, because the cells may be large or small, have irregular nuclei, or fairly regular nuclei. These may take the stain densely or faintly. The acini may

be large or small. At least one interesting and striking feature, however, presents itself in this series of cases. *In no case was invasion of the periacinar tissue seen until the inner row of cells had disappeared.* The invading cells can be traced directly to the outer row. These upon high power examination are similar to the cells seen later in lymph-spaces and metastases.

Growth in Lymph Spaces. The epithelial cells grow into tissues of different densities, sometimes rare connective tissue, sometimes dense scar tissue, and into fat. In these surroundings they vary greatly in shape and size. They may become closely pressed together, so that they are frequently almost cuboidal or at least possess sharp corners and straight sides. These marked morphological characteristics usually occur in dense connective tissue, in which condition they give rise to the picture designated as "scirrhus carcinoma." There may be one or several rows of cells in a lymph space. The amount of connective tissue between the rows likewise varies within wide limits. Where there are numerous rows of cells, so as to form a mass of cells, the condition has been given the name "medullary carcinoma." When the amount of connective tissue is reduced to a minimum and the epithelial cells to a maximum the term "carcinoma sarcomatodes" (Borst) has been used. In fat tissue, epithelial cells grow between the fat cells. All of these conditions, *e. g.*, "scirrhus carcinoma," "medullary carcinoma," and "carcinoma sarcomatodes" may occur in the same specimen, indeed in the same field of the microscope.

The tissue, which the perverted epithelium invades, reacts differently in different cases and in the same specimen. Lymphocytes may or may not be present. In some specimens they are only seen at the borders of masses of cells. In others they may be intimately associated with them.

The only degenerative change which is strikingly common surrounding the cells in the lymph spaces is a hyaline change.

Where such is present the lymphocytes are usually few in number or absent.

Invasion of the lymph nodes and other organs by transmission through the lymph channels will be considered in another communication. These advanced stages bear little relation to the origin of the malignant perversion.

Initial Stimulus. This is still unknown. Borst says, it matters not what the etiological factor is, the cells of cancer will still be the principle feature in the process. The stimulus apparently simply disturbs a normal biological equilibrium of the epithelium. The cells are stimulated to rapid proliferation, which proliferation is too rapid for the production of completely differentiated cells. The epithelial element of carcinoma, therefore, is composed of undifferentiated or partially differentiated cells from which normal secreting cells develop. In the breast, at least, this is clearly seen. The change in the characteristics of the epithelium takes place in the acini. The cut-off "islands of epithelium which develop into carcinoma," described by many and even recent observers, do not apparently occur in carcinoma of the breast. Carcinoma cells are the perverted partially undifferentiated cells from which normal secreting cells develop.

Summary. 1. It may be seen from this brief review that there is a definite pathological foundation for the surgical experience that the condition described as "senile parenchymatous hypertrophy," "abnormal involution," and "chronic cystic mastitis" is often, if not always, associated with carcinoma.

2. We have seen, in the same specimen, the stages through which this association probably takes place.

3. We have also seen pictures in specimens of carcinoma which correspond to those described by many writers as cystadenoma, papillary cystadenoma, intracystic epithelioma, Schimmelbusch's disease, chronic interstitial mastitis, chronic cirrhosing mastitis, chronic cystic mastitis, and polycystic epithelial mastitis.

4. Carcinoma is apparently an outgrowth of the outer row of cells of the acini and not of the secreting cells, and also is not the product of "cut off" epithelial cells by scar tissue.

5. The cells of the outer row of the acini form the growth into the lumen described by Schimmelbusch as cystadenoma. The proliferating cells of the acini, whether these acini are cystic or not after the disappearance of the inner row of cells, present the same irregularities of the nuclei which are seen in the cells which have invaded the stroma, lymph spaces, and lymph nodes. They are irregular in size and shape beyond the normal limits of size and shape of the normal cell. This irregularity is present in the acini, the "basement membrane" of which is still intact.

6. The question arises, Is it necessary to wait for the penetration of the basement membrane before making a diagnosis of carcinoma? From the standpoint of the general pathologist this may be necessary, but if the surgeon waits for such a change he will be basing his procedure upon a definition of carcinoma which does not consider the same characteristic in the cells before and after the penetration of the "basement membrane" distinctive of carcimona. If the pathologist considers the penetration of the basement membrane the essential characteristic of carcinoma, then it must be admitted that the cells in adenoma are often just as irregular as in carcinoma. The surgeon has often learned from bitter experience that tumors which have been considered benign have returned and, indeed, have given rise to metastases.

7. More careful and detailed study of carcinoma cells, "cystadenoma" cells, and the epithelial cells of fibro-adenoma has brought us to the conclusion that the resemblance between these cells is so great, viewed from a practical standpoint, in the face of the fact that pathologists and clinicians both admit that benign tumors do become malignant, that if the desired therapeutic effect is to be accomplished, more "benign" tumors (fibro-adenoma, adenofibroma, and cyst-

adenoma) must be completely enucleated, and more breasts diagnosticated as chronic cystic mastitis, "abnormal involution," or senile parenchymatous hypertrophy must be completely removed.

8. The diagnosis must be made and the therapeutic measures carried out early in order to save the patient.

9. Gross diagnosis, even when made by an expert, can be made in only a certain percentage of cases. The change is often microscopic, especially in fibro-adenomata and chronic cystic mastitis.

10. Early diagnosis must be carried out regardless of the age of the patient, because carcinoma occurs in a wide range of ages. The youngest in this series was aged twenty-three years, the eldest seventy-two years, and the average age was forty-seven years. The youngest benign fibro-epithelial tumor occurred at nineteen years, the eldest at sixty-five years, and the average thirty-three years.

11. The surgeon as well as the pathologist should look upon carcinoma as a process which apparently bears a most striking relationship to all circumscribed or diffuse cystic or non-cystic fibro-epithelial hypertrophies of the breast.

INJURY AS A CAUSATIVE FACTOR IN CANCER

By William B. Coley, M.D.
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That injury or trauma plays an important part in the development of all types of malignant tumors has been recognized by the laity from the earlier times. The question of the causative relationship between trauma and cancer has not, until recently, received the careful scientific investigation which its importance demands. At the French Congress of Surgery, 1907, it formed the chief topic of discussion, and at the recent International Cancer Research Congress of Paris, October 5, 1910, two of the principal papers of the Congress were devoted to this subject.

The most recent paper upon the subject in America is Phelps' article in the *Annals of Surgery*, May, 1910; it is an elaborate attempt to prove that trauma has no influence whatever upon the development of cancer (he limits the use of the word "cancer" to carcinoma). He admits that a "popular belief that a cancer of the breast can always be traced to some contusion or other trivial injury has existed to a very great extent, and he believes this profound belief "has been held with a tenacity which has hypnotized attending physicians into accepting impossible assertions as undoubted facts."

In passing, it may be worth noting that popular beliefs of such long standing and so deeply rooted have almost invariably been proved in the end to be founded upon facts.

Phelps has attempted to answer the question not by adding any new data based upon personal observations, but upon

an analysis of opinions of other men, dating back as far as the earliest history of cancer. He states that he has no records of histories of cancer cases that have come under his own care.

Phelps at the outset states that he uses the word "cancer" to include only carcinoma and not sarcoma. I believe it better to use the word "cancer" to include all forms of malignant tumors, both of epithelial and connective tissue origin, for the reason that up to comparatively recent times "cancer" was universally used in this broad, general way, both by the laity and the profession. We certainly need some word to include all types of malignant tumors, and no better term could be found than the word "cancer." Still further, the word "cancer" is at the present time used to include all malignant tumors by all the workers in cancer research throughout the world. So then, in dealing with the question of trauma as a causative factor in malignant tumors, we may as well consider all types of cancer. A careful study of all the varying types of malignant disease shows practically the same apparent causative influence from injury, although the percentage of cases associated with antecedent trauma may be slightly greater in sarcoma than carcinoma. But numerous cases of so-called acute traumatic malignancy will be found in all types.

The question cannot be settled by any review of old statistics, especially of hospital statistics taken by a house officer just beginning his experience in history-taking and usually following the routine custom handed down from previous generations of house surgeons. The only way the matter can be settled, even approximately, is by careful records of either a large number of personal observations or, better still, by the records of a large cancer hospital in which careful and uniform histories have been kept over a long period of years. Such records are, unfortunately, at the present time not in existence. The number of cases of cancer at any general hospital is too small to give the required data, without going back over a long period of

years, too far to insure uniform methods in history taking, and hence of little value in connection with such a question. Therefore, at present we must still rely on the results of large personal experience, carefully and uniformly recorded. For the reason that twenty years ago I began to make special investigations in sarcoma, my opportunit es for a study of this type of cancer has been unusually large, and it is the results of this personal experience, particularly in reference to the association of trauma and sarcoma, that I desire to place before you at this meeting. My cases are all from histories taken myself and not gathered from hospital statistics.

Time will permit only the very briefest synopsis:

Up to November 24, 1897, I had had under my care 170 cases of sarcoma, and had careful histories of these cases. In a paper entitled "The Influence of Injury upon the Development of Sarcoma," read before the New York Surgical Society, in November, 1897 (*Annals of Surgery*, March, 1898), I said that "no clinical feature of the disease had impressed me more strongly than the frequent association of trauma with its early manifestations." I started out with no theory to prove, but with an impartial mind, and I did not write my paper until I had personally observed 46 cases of antecedent trauma in a total of 170 cases of sarcoma. In that paper I gave a detailed history of each of these cases, and while in some the interval elapsing between injury and the development of the tumor was sufficiently long to justify some doubt as to any causative relationship, in most cases it was so short that to rule it out as a coincidence without causative relationship would be begging the question. In 9 of the 46 cases the tumor developed within one week following the injury at the exact site of injury.

Since writing this paper, I have observed 800 additional cases of sarcoma, making a total of 970 cases, and of the 800 new cases a definite history of trauma was noted in 179 cases; or in the entire series of 970 cases, 225 times; 23 per cent.

The tumor developed within the first month after the injury in 117 cases of typical acute traumatic malignancy, the reality of which Phelps and others deny.

These cases are very briefly enumerated in the following tables. A number of the more important cases are given in greater detail in the body of the paper.

TABLE I.—SYNOPSIS OF PERSONAL CASES PREVIOUSLY PUBLISHED *Annals of Surgery*, 1898

No.	Age.	Sex.	Diagnosis.	Site.	Nature of injury.	Interval between injuries and appearance of tumor.
1	18	F.	Round-celled	Metacarpal-bone	Blow	At once
2	28	F.	Round-celled	Spine	Fall	1 year
3	37	M.	Melanotic	Thumb	Contusion	At once
4	7	F.	Mixed-celled	Ovary	Fall	2 months
5	55	F.	Cylindroma	Breast	Blow	1 week
6	25	M.	Round-celled	Testis	Blow	2 years
7	11	M.	Round-celled	Thigh (popliteal space)	Blow	Less than 1 year
8	59	M.	Angiosarcoma	Breast	Blow	3 months
9	41	M.	Round-celled	Arm	Blow	2 years
10	46	F.	(?)	Neck	Scratch	Soon
11	8	F.	Round-celled	Chest	Blow	6 weeks
12	43	M.	Round-celled	Mastoid	Severe blow	4½ years
13	20	F.	Spindle-celled	Femur	Fall	At once
14	31	F.	Round-celled	Breast	Blow	Few days
15	31	F.	(?)	Breast	Blow	Few days
16	11	F.	Spindle-celled	Femur	Fall	At once
17	26	F.	Round-celled	Femur	Sprain	1 to 2 years
18	48	F.	Spindle-celled	Thigh	Strain (muscular)	2 years
19	29	M.	Round-celled	Testis	Fall	3 to 4 weeks
20	22	M.	Round-celled	Testis	Fall and contusion	2 to 3 weeks
21	27	F.	Round-celled	Axilla	Laceration (finger)	1 week
22	55	M.	Mixed-celled	Parotid	Blow	4 to 6 weeks
23	55	F.	Round-celled	Calf of leg	Fall	2 to 3 months
24	14	M.	Round-celled	Ribs	Blow	6 months
25	53	M.	Mixed-celled	Parotid	Blow	5 years
26	14	M.	(Osteo.?)	Ilium	Contusion	1½ years
27	30	M.	Round-celled	Clavicle	Fracture	1½ years
28	26	M.	Round-celled	Femur	Sprain	Few weeks
29	55	M.	Round (myxosarcoma)	Thigh	Gun-shot wound	25 years
30	27	F.	Round-celled	Breast	Burn (carbolic acid)	3 months
31	36	M.	Osteochondroma	Shoulder	Sprain	6 months
32	30	F.	Osteochondroma	Ilium	Fall	3 months
33	38	F.	Osteochondroma	Lower jaw	(?)	Few weeks
34	29	M.	Mixed-celled	Eye	Scratch	Few weeks
35	55	M.	Round-celled (melanotic)	Ball of foot	Laceration from nail in shoe	Few weeks
36	12	M.	Round-celled	Tibia	Fall	2 months
37	5	F.	Round-celled	Femur	Old fracture	1 to 2 years
38	24	F.	Round-celled (melanotic)	Tibia	Fall	At once
39	16	F.	Spindle-celled	Foot	Fall	Few weeks
40	26	M.	Round-celled	Tibia	Blow	Few weeks
41	50	M.	Round-celled	Kidney	Fall and contusion	6 months
42	40	M.	Spindle-celled	Parotid	Blow	Few months
43	39	F.	Melanotic	Foot	Contusion	Few weeks
44	50	F.	Melanotic	Leg	Scratch	Few days
45	73	M.	Round-celled	Tonsil	Contusion	5 days
46	23	F.	Osteochondroma sarcoma	Ilium	Fall	2 injuries— 1 ten years, 1 two years, before

TABLE II

No.	Name.	Sex.	Age.	Date of history.	Locality.	Character of injury.	Interval between injury and trauma.	Type.
1	C.	M.	15	1909	Ribs	Run over by carriage	3 months	
2	D.	F.	10	1902	Skull	Blow from stone thrown by boy	2 months	
3	D.	F.	15	1907	Scrotum	Fall from bicycle	Few weeks	
4	D.	M.	12	1907	Femur	Fall from tree	3 weeks	
5	E.	M.	29	1904	Scalp Head	Struck by baseball bat	2 years	Fibroma changing to sarcoma
6	F.	F.	35	1906	Cheek	Mole tied off with silk	Few days	Melanotic
7	F.	F.	45	1906	Forearm	Blow (bruise)	2 to 3 weeks	Round-celled
8	F.	F.	41	1896	Humerus	Struck with rake handle	2 years	Round-celled
9	F.	F.	26	1908	Radius	Fall	1, 3 years 2, 2 or 3 wks.	Round-celled
10	F.	F.	24	1906	Ulna	Blow (contusion)	1 month	
11	S.	F.	52	1898	Fibula	Fall	3 months	
12	H.	M.	56	1898	Heel	Injury from nail in shoe	Few months	Round-celled melanotic
13	F.	M.	47	1908	Heel	Blister from shoe	Few months	Melanotic
14	B.	F.	28	1901	Thigh	Fall from bicycle	2 years	
15	B.	F.	60	1905	Neck	Strain	Few days	
16	B.	F.	7	1896	Ovary	Bad fall on abdomen	2 months	
17	B.	M.	12	1908	Ilium	Struck by baseball bat	5 months	
18	B.	M.	25	1899	Superior maxilla	Fall from bicycle	4 months	
19	B.	M.	51	1899	Ilium	Blow	Few months	
20	B.	F.	65	1895	Orbit	Blow	Few months	
21	A.	M.	31	1895	Testis	2 severe injuries to same testis	1, 14 years 2, 9 years	
22	B.	F.	36	1898	Foot	Stepped on by horse, severe bruise	2 to 3 months	
23	A.	M.	43	1903	Femur	Fall	Few days	
24	A.	M.	26	1902	Forearm	Severe strain getting off car	3 months	
25	R.	F.	41	1906	Ear	Blow	Few days	Pigmented mole melanotic sarc.
26	F.	M.	44	1901	Mesenteric glands	Severe contusion of abdomen	Symptoms directly after injury. Tumor few months	
27	G.	M.	35	1909	Femur	Kick by horse	Few days; 1 week	
28	N.	M.	24	1904	Testis	Blow	1 week	
29	S.	M.	51	1907	Superior maxilla	Blow; struck piece of timber	5 months	
30	W.	M.	28	1909	Femur	Contusion	5 months	
31	G.	M.	6½	1899	Hand	Fall; bruise	Few days	
32	G.	M.	42	1901	Testis	Blow; contusion	Few days	
33	G.	F.	45	1905	Calf of leg	Injury; pigmented mole, while riding	Few days	
34	G.	M.	48	1908	Testis	Contusion; riding horseback	Few days	
35	H.	M.	28	1902	Superior maxilla	Thrown from carriage; contusion	2 years	
36	G.	M.	14	1906	Ilium	Fell down stairs; injury to left ilium; 1 yr. later fell down again.	Few weeks after 2d injury	
37	V.	F.	42	1900	Thigh	Ran against door; contusion	6 weeks	
38	V.	M.	28	1904	Femur	Fall	Few weeks	
39	T.	M.	39	1909	Scapular region	Severe contusion	1 month	
40	R.	M.	25	1906	Ilium	Fall	10 years	

TABLE II—(*Continued*)

No.	Name.	Sex.	Age.	Date of history.	Locality.	Character of injury.	Interval between injury and trauma.	Type.
41	F.	F.	43	1905	Retroperitoneal	Fall	8 years	
42	F.	M.	29	1908	Pectoral region	Strain; pectoral muscle	Soon	
43	M.	M.	40	1907	Little toe	Run over by auto	Few days later	
44	H.	M.	45	1905	Face	Applied caustic to pigmented mole	Few days	
45	H.	F.	8	1895	Face	Severe slap on face	6 weeks later	
46	S.	M.	42	1905	Femur	Severe wrench of knee	10 months	
47	T.	M.	39	1899	Thigh	Run over by truck	6 months	
48	T.	M.	46	1904	Testis	Fell astride barrel, injured right testis when a boy	25 years (?)	
49	T.	F.	60	1907	Forehead; frontal bone	Struck forehead against sharp corner of bureau	2 to 3 weeks	
50	V.	M.	33	1906	Tibia	Twist of knee	10 months	
51	T.	M.	45	1906	Ulna	Severe strain; twist	Few weeks	
52	S.	M.	21	1908	Forearm	Blow; football	Few weeks	
53	S.	F.	50	1893	Gluteal region	Fall striking buttock on edge of board	Few days; 1 week	Photo
54	S.	M.	51	1906	Gluteal region	Trauma from pigmented mole	At once	Melanotic sarcoma
55	S.	M.	10	1901	Ilium	Fall down stairs	1 month	
56	S.	M.	53	1897	Parotid	Blow	5 years	
57	S.	M.	32	1907	Ilium	Fall	8 monyths	
58	C.	M.	15	1909	Femur	Fall, 30 ft.; 2 yrs. later, 2d fall fracturing femur	2 months sarcoma developed in	
59	S.	M	21	1893	Clavicle	Fracture	1 year	
60	C.	F.	55	1908	Femur	Blow	Soon; few weeks	
61	C.	M.	27	1901	Thigh	Blow playing baseball	2 months	
62	C.	M.	10	1909	Tibia	Bruise; blow	8 months	
63	C.	M.	37	1908	Pectoral region	Strain of muscle	Few days later	
64	C.	M.	30	1904	Thigh	Blow	Soon; 2 to 3 weeks	
65	C.	M.	23	1907	Thigh	Pigmented mole tied off with silk	Few days	Melanotic
66	H.	M.	20	1906	Tibia	Sprain	Soon; few wks	
67	H.	M.	42	1907	Kidney	Kick	2½ years	
68	H.	F.	29	1907	Radius	Severe blow	5 months	
69	H.	M.	15	1908	Femur	Fall; injury upper part of femur	Tumor; 3 months	
70	H.	M.	46	1908	Humerus	Fall	4 weeks	
71	I.	M.	8	1901	Back	Severe bruise from fall	2 to 3 weeks	
72	I.	F.	59	1909	Heel	Trauma from nail in shoe	Soon	Tumor stationary several years
73	I.	M.	31	1908	Neck	Muscular strain	4 weeks	
74	K.	M.	49	1899	Neck	Blow from block of wood	4 months	
75	K.	M.	23	1900	Femur	Fall	1 year	
76	K.	M.	51	1898	Clavicle	Carried heavy bar of steel on shoulder for ¼ mile	1 month later; tumor exact site	
77	K.	F.	16	1894	Metatarsalbone	Face	Few weeks	
78	L.	F.	18	1898	Femur	Fall	2 months	
79	L.	F.	40	1899	Face	Blow from fist	Few days	
80	L.	M.	35	1906	Pubic bone	Injury by forceps delivery; difficult labor	2 months	
81	L.	M.	35	1905	Inguinal region	Slipped, with severe strain of muscles in groin	Few weeks	

TABLE II—(*Continued*)

No.	Name.	Sex.	Age.	Date of history	Locality.	Character of injury.	Interval between injury and trauma.	Type.
82	L.	F.	44	1906	Thigh	Strain	2 to 3 weeks	
83	L.	M.	13	1906	Supraclavicular glands	Strain	2 to 3 weeks	
84	L.	M.	31	1904	Testis	Severe kick	Soon after; few days	
85	L.	M.	33	1908	Mole on ankle	Cauterized	At once	
86	L.	F.	43	1906	Gluteal region	Knocked down by bicycle, striking on buttocks	1 year	
87	L.	M.	11 m.	1907	Tibia	Strain	2 days	
88	O.	M	62	1898	Clavicle	Severe blow by beam	9 years; exact site	
89	O.	M.	13	1909	Back	Fell from hammock. Hard floor	1½ years	
90	P.	M.	29	1908	Ilium	Thrown from horse; dragged 21 feet	8 years	
91	P.	F.	32	1908	Buttock	Fell through broken floor; severe bruise	Few days	
92	P.	M.	45	1902	Pectoral region	Severe muscular strain	6 months	
93	S.	F.	42	1906	Toe	Heavy iron fell on toe; 4 yrs. later, 2d injury, heavy iron on same toe	1st inj. 4 yrs.; developed soon, few weeks after 2d injury	
94	L.	M.	45	1906	Parotid	Severe blow; fell on log	3 years	
95	M.	F.	10	1907	Tibia	Blow	4 months	
96	L.	F.	59	1905	Femur	Fall from street car	6 months	
97	L.	M.	21	1906	Ribs	Fall; fractured ribs	Few weeks	
98	M.	F.	37	1900	Thigh	Blow against lounge	2 weeks	
99	M.	M.	55	1903	Humerus	Blow	Few days	
100	M.	M.	10	1908	Ilium	Ran against telephone pole; bruise of thigh	2 weeks	
101	M.	F.	41	1900	Breast	Fell from bicycle, bruising breast	2 weeks	
102	B.	M.	52	1908	Ilium	Fall	2 to 3 weeks	
103	M.	M.	27	1898	Testis	Blow	Small tumor appeared almost at once; remained dormant 6 years, then began to grow	
104	M.	M.	28	1899	Testis	Fall from bicycle	1 year	
105	M.	M	22	1898	Ischium	Fall on ice striking tuberosity ischium	Few days later	
106	M.	F.	37	1898	Inferior maxilla	Severe blow	2 to 3 months	
107	M.	M.	55	1898	Parotid	Severe blow from horse's head	2 to 3 weeks	
108	M.	M.	8	1902	Superior maxilla	Fell from bicycle, driving eye-tooth into upper jaw	1½ years	
109	M.	M.	46	1905	Ischium	Fall	2 years	
110	N.	M.	38	1907	Ischium	Fall on sidewalk striking tuberosity of ischium	2 months	
111	S.	M.	25	1906	Ulna	Green stick fracture	2 to 3 months; began in callus	
112	W.	F.	46	1909	Supraclavicular glands	Blow from falling window	1 week	
113	W.	M.	60	1899	Inferor maxilla	Piece of jaw broken off in extracting tooth	Few weeks	
114	H.	M.	35	1906	Femur	Fall	Few weeks; 2 to 3	

TABLE II—(*Continued*)

No.	Name.	Sex.	Age.	Date of history.	Locality.	Character of injury.	Interval between injury and trauma.	Type.
115	W.	F.	20	1900	Tibia	Fall	1½ years	
116	W.	F.	15	1907	Humerus	Blow	10 years	
117	C.	M.	37	1898	Groin	Blow; ran against corner of table	Few days	
118	C.	F.	25	1898	Parotid	Blow from baseball	2 years	
119	C.	F.	36	1898	Scalp	Heavy blow from falling window	Few days	
120	V.	M.	16	1909	Clavicle	Severe muscular strain	3 weeks	
121	L.	M.	32	1910	Humerus	Fracture	5 to 6 weeks	
122	F.	F.	46	1910	Tibia	Blow	Few weeks	
123	H.	M.	63	1910	Back	Fall	4 years	
124	G.	M.	31	1910	Calf of leg	Trauma; pigmented mole	At once	
125	M.	M.	42	1904	Testis	Contusion	2 to 3 months	
126	F.	M.	38	1906	Clavicle	Severe muscular strain	1 week	
127	O.	M.	11	1909	Rectus muscle	Blow	Few weeks	
128	G.	M.	14	1901	Tibia	Sprain of leg	Few days later pain and swelling	
129	D.	M.	19	1897	Thigh	Pigmented mole ligated with silk	Few days	Melanotic?
130	D.	M.	33	1899	Thigh	Bad fall; rendered unconscious	6 months	
131	G.	M.	21	1902	Back	Wrenched back wrestling	Few weeks	
132	H.	M.	24	1899	Superior maxilla	Piece of jaw broken off extracting tooth	2 months	
133	H.	M.	18	1899	Humerus	Fall, 3 stories, injuring shoulder	2 months	
134	L.	F.	44	1903	Inferior maxilla	Jaw injured in extracting tooth	2 months	
135	M.	M.	58	1899	Humerus	Injured shoulder against trolley car	1 month	
136	M.	M.	29	1910	Sacro-iliac	Sprain	Few weeks	
137	M.	F.	37	1902	Foot	Trauma to pigmented mole	Few weeks	Melanotic
138	N.	M.	2 m.	1910	Scapula	Difficult birth; left shoulder strained	2 weeks	
139	R.	M.	35	1905	Undescended testis	Trauma from application of truss	Few weeks, pain and swelling	
140	R.	F.	34	1910	Fibula	Kicked by horse, 1897	Tumor (bony) few wks. later site of injury	
141	R.	M.	46	1907	Orbit	Blow	Few days	
142	T.	M.	52	1903	Pectoral region	Trauma to pigmented mole	At once	Melanotic
143	L.	F.	24	1899	Thigh	Repeated trauma; sitting on hard chair sewing machine	Tumor developed just where edge of chair touched thigh	
144	S.	M.	5½	1899	Groin	Fall	Few days	
145	W.	M.	55	1901	Thigh	Trauma to pigmented mole	Few days	
146	H.	M.	34	1908	Clavicle	Heavy plank fell on shoulder	6 years	
147	A.	F.	32	1909	Thigh	Trauma to pigmented mole (electric cautery)	At once	
148	B.	M.	49	1900	Femur	Fracture from kick of horse	2 to 3 months	
149	N.	M.	50	1910	Thigh	Blow	Few weeks	
150	J.	F.	19	1910	Hand	Sprain	Few weeks	

TABLE II—(*Continued*)

No.	Name.	Sex.	Age.	Date of history.	Locality.	Character of injury.	Interval between injury and trauma.	Type.
151	H.	F.	58	1901	Breast (skin)	Fall	2 years	Melanotic
152	G.	M.	32	1901	Abdominal wall	Fall down stairs	2 to 3 months	
153	K.	M.	37	1906	Shoulder (humerus)	Strain	1 month	
154	M.	M.	46	1903	Clavicle	Dislocation of shoulder	2 to 3 months later	
155	H.	M.	40	1908	Clavicle	Severe contusion from falling box of steel	2 to 3 weeks	
156	W.	M.	37	1900	Thigh	Fall	Few weeks	
157	K.	M.	10	1911	Groin	Blow	Few weeks	
158	K.	F.	16	1904	Ilium	Fall	Few months	
159	P.	F.	35	1910	Ilium	Fall	6 months	
160	G.	F.	52	1898	Fibula	Fall	2 months	
161	T.	F.	35	1898	Thigh	Fall	Few days	
162	M.	F.	41	1900	Breast	Fall; contusion of breast	1 year	
163	Q.	F.	60	1899	Leg	Ligature of pigmented mole	At once	
164	K.	M.	18	1909	Foot	Tearing ligaments; forcible correction of flat foot	2 weeks	
165	H.	M.	10	1910	Inguinal canal	Hernia operation	5 weeks after operation	
166	S.	M.	6	1899	Femur	Fall	Few weeks	
167	S.	M.	40	1906	Femur	Fall	Few months	
168	V.	M.	45	1905	Thigh	Blow	Few months	
169	T.	F.	58	1905	Forehead	Blow	1 month	
170	M.	F.	32	1906	Breast	Blow	2 weeks	
171	D.	M.	15	1906	Sacrum	Sprain	Few weeks	
172	V.	M.	33	1906	Tibia	Fall; twist of knee	10 months	
173	B.	F.	..	1910	Shoulder	Blow	Few weeks	
174	B.	M.	16	1910	Coccyx	Kick	1 week	
175	C.	M.	40	1908	Toe	Run over by auto	2 to 3 weeks	
176	M.	F.	19	1904	Femur	Fracture	Few weeks	
177	M.	M.	8	1906	Clavicle	Fall fron stone fence	3 to 4 weeks	
178	S.	M.	5	1911	Back; extra spinal	Fall	Few weeks	
179	S.	M.	14	1910	Sacrolumbar spine	Fall on ice, severe blow sacral region	Pain severe 2 months later; swelling 6 months later	

From the foregoing tables it will be seen that 105, or 66.66 per cent., of the cases originated in the bone; 120, or 53 per cent., in the soft parts.

They were distributed as follows:

Bones

Femur	21
Fibula and tibia	15
Humerus	7
Ulna	3
Radius	2
Matatarsal bone	2
Clavicle	10
Scapula	4
Ilium	15
Ischium	3
Sacrum	1
Coccyx	1
Spine	2
Pubic bone	1
Ribs	3
Skull	1
Mastoid	1
Orbit	3
Forehead	2
Superior maxilla	5
Inferior maxilla	3
	105

Soft Parts

Thigh	19
Leg	5
Inguinal region	4
Ankle	1
Foot	7
Toe	3
Heel	3
Forearm	4
Hand	3
Thumb	1
Abdomen	3
Rectus muscle	1
Kidney	2
Gluteal region	5
Breast, pectoral region, and axilla	14
Back	5
Chest	1
Supraclavicular glands	2
Scapula region	1
Neck	4
Tonsil	1
Parotid	8
Face	3
Scalp	2
Cheek	1
Ear	1
Testis	13
Scrotum	1
Ovary	2
	120

Fig. 1.—Periosteal round-celled sarcoma of the femur; appeared two to three weeks after sprain. (Case XXVIII, Table I.)

Fig. 2.—Round-celled sarcoma of femur (following trauma). Amputation of hip-joint. (Case XXXVII, Table I.)

Fig. 3.—Sarcoma of upper end of femur. First noticed three weeks after fall from tree. (Case IV, Table II.)

FIG. 4.—Fibroma, later changing to fibrosarcoma, finally causing death. Followed blow on back of head by baseball bat. (Case V, Table II)

FIG. 5.—Sarcoma of forehead; developed two to three weeks after blow against sharp corner of bureau. (Case XLIX, Table II.)

FIG. 6.—Simple spiral fracture of humerus. *X*-ray taken through plaster splint a few days after injury. (Case I, see text.)

FIG. 7.—Same case, showing well-developed sarcoma at site of fracture. *X*-ray taken two months later. (Case I.)

FIG. 8.—Same case after four months' treatment with the mixed toxins of erysipelas and Bacillus prodigiosus. Almost complete disappearance of the tumor. New formation of bone and reunion of pathological fracture. (Case I.)

Fig. 9.—Round-celled sarcoma originating in scar (cicatrix) of a hernia operation within four weeks after operation. Associated with a sarcoma of upper jaw, occurring just before. Caused death in three months. (Case II, see text.)

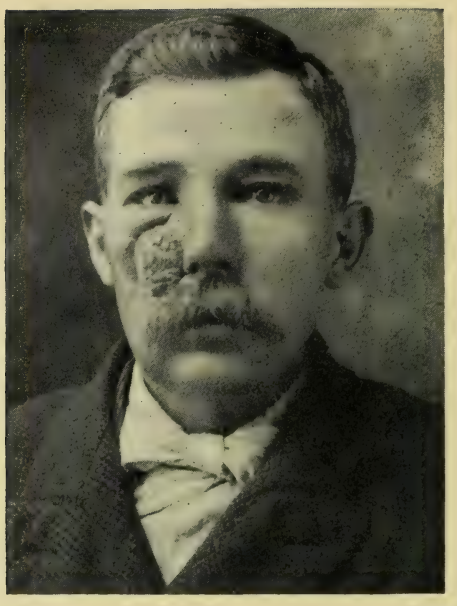

Fig. 10.—Round-celled and spindle-celled sarcoma of superior maxilla. (Case XXXI.)

Fig 11.—Round-celled sarcoma of breast. Acute traumatic malignancy. (Case XXXIX.)

PERIOD OF TIME INTERVENING BETWEEN INJURY AND APPEARANCE OF TUMOR

Less than 1 week	50
1 to 2 weeks	13
2 weeks to a month	54
1 to 2 months	23
2 to 6 months	31
6 to 12 months	15
1 to 2 years	17
2 to 3 years	5
Over 3 years	17
	225

The interval elapsing between the injury and the appearance of the breast tumor was as follows:

Less than 1 week	5
2 weeks to a month	14
1 to 2 months	3
2 to 6 months	8
6 to 12 months	7
1 to 2 years	5
2 to 3 years	3
Over 3 years	7
	52

The closest connection between the effect of injury upon sarcoma and carcinoma is found in the group of tumors classed as melanotic sarcomas. Nineteen of such cases are included in my series in which the development of the tumor followed some definite injury, such as the tying off of a pigmented mole, or bruising it sufficiently to make it bleed, or burning it with a cautery.

Now, this group of tumors is classed by some pathologists as sarcoma, by others, and an increasing number at the present time, as carcinoma. Certainly, in many features, like the involvment of the nearest glands, they closely resemble the carcinomatous group.

TABLE III.—CASES OF CARCINOMA OF BREAST, ASSOCIATED WITH ANTECEDENT TRAUMA

No.	Name.	Sex.	Age.	Date of history.	Locality.	Character of injury.	Interval between injury and first appearance of tumor.	Remarks.
1	B.	F.	43	1909	Breast; double	Caught in door of elevated train. Severe bruise; both breasts	6 yrs. later tumor began in both breasts 3 inches apart	
2	P.	F.	59	1906	Right breast	Fell striking breast, on back of chair	2 weeks	
3	D.	F.	39	1906	Both breasts	Pressure of aluminum corset	(?)	
4	E.	F.	56	1907	Right breast	Blow	Few weeks	
5	M.	F.	55	1895	Right breast	Blow	Few weeks	
6	G.	F.	68	1910	Left breast	Kicked by 2-year-old child	6 months	
7	T.	F.	60	1910	Right breast	Fall, injuring breast	Few weeks	Death 2 years
8	P.	F.	70	1906	Right breast	Blow against iron faucet	1 month	
9	S.	F.	64	1905	Right breast	Blow; struck against fence, injuring breast	Soon (few days)	
10	C.	F.	33	1895	Right breast	Blow; black and blue area	Effects of blow disappeared; 2 to 3 weeks later lump	
11	D.	F.	33	1902	Double breast	Knocked down striking both breasts on asphalt pavement	R. 2 to 3 wks; L. 6 months	
12	D.	F.	59	1908	Left breast	Blow; struck breast against heavy piece of furniture	2 months	
13	G.	F.	48	1902	Left breast	Fall	2 to 3 mos.	
14	H.	M.	64	1903	Right breast	Blow	6 months	
15	L.	F.	45	1903	Left breast	Blow	2 years	
16	S.	F.	60	1903	Left breast	Severe blow by elbow of a hospital patient	2 months	
17	M.	F.	46	1903	Right breast	Fell flat upon pavement, injuring right breast	6 months	
18	M.	F.	37	1901	Left breast	Blow; struck by batted base ball	Tumor in 3 to 4 days; exact site of injury	
19	M.	F.	46	1904	Left breast	Blow from thrown baseball	5 months	
20	B.	F.	39	1907	Right breast	Ran against sharp corner of table (severe blow)	Tumor in few days	
21	R.	F.	27	1910	Right breast	Fell, striking right breast upon wooden chest	3 years	
22	B.	F.	45	1904	Right breast	Blow	2 to 3 weeks	
23	A.	F.	62	1895	Left breast	Fall; striking on left breast	1 year	
24	B.	F.	45	1897	Right breast	Blow; ran against banister	1 year	
25	B.	F.	38	1896	Right breast	Fall	Few weeks	
26	B.	F.	49	1900	Right breast	Blow	3 years	
27	C.	F.	43	1895	Right breast	Severe blow from tennis ball, caused fainting	1 year	
28	C.	F.	59	1905	Left breast	Severe strain to pectoral muscle	2 years	
29	C.	F.	54	1908	Right breast	Severe blow	Few months	
30	C.	F.	43	1908	Left breast	Severe blow	2 to 3 weeks	
31	C.	F.	57	1905	Right breast	Severe blow; struck against bedstead	2 months	
32	B.	M.	35	1900	Right breast	Struck with baseball	(?)	

TABLE III—(*Continued*)

No.	Name.	Sex.	Age.	Date of history.	Locality.	Character of injury.	Interval between injury and first appearance of tumor.	Remarks.
33	M.	F.	39	1905	Left breast	Trauma from wearing bag of jewels under corset, against breast	3 to 4 months	
34	M.	F.	50	1906	Right breast	Fell, striking on left breast on table	3 to 4 weeks	
35	M.	F.	50	1907	Right breast	Fell, striking on right breast on corner of bedstead	Few weeks	
36	P.	F.	55	1903	Left breast	Struck left breast against trolley car	Pain, 1 month Trauma, 2 months	
37	R.	F.	37	1898	Left breast	Fell, striking breast against bedstead	3 to 4 weeks	
38	R.	F.	39	1902	Right breast	Severe blow, striking breast against large nail in wall	1 year	
39	S.	F.	63	1896	Right breast	Bruise in carrying heavy wooden pole under arm	6 months	
40	S.	F.	40	1896	Right breast	Blow	1½ years	
41	S.	F.	30	1895	Left breast	Severe blow against bedstead	14 years	
42	S.	F.	39	1899	Right breast	Blow; ran against heavy wooden object	6 months	
43	S.	F.	48	1901	Left breast	Severe blow from bicycle	4 years; exact site	
44	S.	F.	36	1906	Right breast	Severe blow; ran against table	5 months	
45	S.	F.	70	1906	Right breast	Blow; severe bruise by striking breast against bedstead. Iron	Black and blue came at once; tumor developed few days later	
46	T.	F.	42	1895	Left breast	Blow	Few weeks	
47	W.	F.	55	1910	Left breast	Blow; struck breast against door knob	3 to 4 weeks	
48	W.	F.	40	1907	Right breast	Fell, striking right breast against corner of wooden box.	Some swelling next day. All disappeared. Tumor appeared exact site few weeks later	
49	W.	F.	30	1905	Left breast	Kicked in left breast by 2-yr.-old child; caused black and blue area.	Tumor 1 mo. later; exact site of injury	
50	C.	F.	37	1910	Right breast	Blow	2 to 3 weeks	
51	S.	F.	54	1907	Left breast	Blow; ran against sideboard, injuring left breast	9 months	
52	C.	F.	54	1901	Right breast	Kicked by child	2 years	

While I have not had so large an opportunity to study the relationship between trauma and carcinoma, I have made an analysis of a series of 250 cases of carcinoma which have come under my personal observation, and in which the histories were taken by myself. In this series of cases there was a history of antecedent trauma in 82 (32.8 per cent.); 120

cases were carcinoma of the breast, in 52 (42.33 per cent.) of which there was a history of a single antecedent trauma. This may seem like a very large percentage, but it is smaller than was observed at the Presbyterian Hospital by McWilliams.

Clarence A. McWilliams, in the Medical and Surgical Report of the Presbyterian Hospital, on "Statistics of 100 Cases of Cancer of the Breast" (*Med. News*, April 28, 1900) observed at said hospital, states, with reference to trauma as a causative factor: "In our list there is a record on this point in 65 of the patients, of which number, 29, or 44.6 per cent., gave the history of a distinct antecedent trauma."

To fully explain the nature of this relationship is quite another problem than to prove that it actually exists.

Von Bergmann has no doubt that a single contusion of the muscles or glands may be the predisposing cause for all types of cancer, and his explanation that the injury produces an extravasation of blood which remains as a focus which, later, forms a favorable nidus for the development of a cancer, is perhaps as reasonable as any that has been offered.

In my earlier paper on "The Influence of Injury upon the Development of Sarcoma" (*Annals of Surgery*, March, 1898) I offered as a possible explanation of the causative relationship of trauma to sarcoma, that "We have only to follow out the analogy between sarcoma and tuberculosis. If we can explain how it is that tuberculous inflammations of the bones develop after an injury in children previously apparently in good health, then the same explanation could be applied to sarcoma." That such cases are by no means uncommon has been proved by Gude, Tilmann, and other surgeons. The probable explanation in these cases is that the tubercle bacilli exist latent in many individuals, and may remain harmless indefinitely under normal conditions. The trauma lowers the vitality and, hence, the resisting power of

the part injured, and the bacilli, previously innocuous, gain a foothold and develop. We know that we can get a suppurative periostitis from traumatism without any breaking of the continuity of the skin, and we must explain this in the same way. It is not difficult to believe that the infectious cause of sarcoma is one widely distributed and generally innocuous until some cause, *e. g.*, a trauma, places the tissues in such a condition as to furnish the proper soil for its development.

Dr. John B. Murphy, in his recent paper on "The Surgery of the Joints," read before the New York Academy of Medicine (*Medical Record*, February 11, 1911), states: "Virulent pneumococci were injected in dogs with a very fine needle and without producing any trauma or displacement of the endothelial cells; there resulted no response to the infection; when traumatization of the endothelium took place, however, there was a decided response."

The question of the relationship between injury and cancer has received a good deal of attention during the last three years in Europe, especially from a medicolegal point of view. One of the most important papers that has ever been written upon the subject was that of Paul Segond, professor of clinical surgery of the faculty of medicine, France, presented before the Congress of French Surgeons, in October, 1907, and discussed at great length. Segond attempted not only to determine whether or not there was a causal relationship between injury and the development of malignant tumors from the medical point of view, but he went further and discussed the problem from the medicolegal standpoint.

He said that in France, same as in Germany and Belgium, the law is based exclusively upon a principle of indemnification, which holds that every injury sustained in the course of work is subject to an indemnity, fixed in advance and varying according to the diminished capacity of the injured person for performing his work, but absolutely independent of any diseases or infirmities he might have had prior to

the accident. From a legal standpoint the three following conditions must obtain.

1. It is necessary to prove that an accident occurred.

2. That there was a relation of cause and effect between the accident and the neoplasm.

3. That the accident was connected with the work in hand.

The law does not apply to professional maladies. In other words, no indemnity is granted in cases in which the tumor is supposed to have been the result of repeated slight injuries or prolonged irritations connected with the particular occupation of the claimant. It must be an accident; that is to say, a bodily "lesion resulting from the action of an external and sudden cause, occurring in the course of labor." The law takes no account of anterior states or predispositions. In France, Segond states, the law concerning the accidents of labor was promulgated in 1898, and claims for indemnity for tumors were exceedingly few up to that time; practically all failed to receive any indemnity owing to the declaration (on the part of the defendants) that the tumor existed prior to the accident. He cites what he calls a very remarkable case, published by Gerné, Didier, and Jeanne, of Rouen (*La Normandie Médicale*, December 15, 1906, in which the causal relationship between accident and cancer was sustained by the court. This case is worth recording in brief:

Man, aged thirty-two years, in September, 1904, fell upon a rail and received localized contusions of his left knee. He remained in bed eight days and then resumed his work. Seven months later, the following February, he was obliged to stop work on account of the pain in the knee. He noticed an enlargement at about this time, which continued to increase in size. Amputation was performed by Jeanne in September, 1905, for osteosarcoma of the tibia. In October, Drs. Gerné, Didier, and Jeanne were commissioned by the court of Rouen to examine the patient and to state whether

the amputation became necessary as a consequence of the accident of September 20, 1904. Their conclusion was: "In the present case it is impossible to break the chain of facts—contusion at the precise point at which later was found the maximum development of a sarcoma. A period of some months, during which there seemed to be practically no result from the contusion. (This latent period proves that the assumption of the preëxistence of a tumor at this point was not admissible.) After this delay, pain and the progressive development of a tumor, eleven months after the accident, sufficiently developed to be recognized externally, we consider truly that one can only regard this as an example in which a sarcoma was caused by a contusion." The court accepted the opinion expressed by the experts and condemned the interested company to pay him a pension representing the incapacity resulting from the amputation.

Segond states that in Germany four conditions must be fulfilled for internal cancer of supposed traumatic origin:

1. The accident must have been of a nature to provoke an internal lesion, such as a laceration or contusion of the mucous surface of the stomach or intestine, which may favor the later development of a cancer.

2. The victim must have had the appearance of perfect health before the accident.

3. Since the accident and up to the time of death the victim must have had symptoms of disease proving the steady progression of the inflammation of the mucous membrane, gradually transforming the condition into cancerous disease.

4. The autopsy must have revealed the presence of a cancer in the region of the traumatism.

Segond shows how much more strongly and broadly the theory that injury may be the cause of a malignant tumor has been accepted in Germany than in France.

He cites 3 cases in which the courts allowed an indemnity for intra-abdominal cancer on the ground that it was presumably the result of an injury. One was a cancer

of the stomach, following a severe contusion of the thoracic region; the second, a cancer of the stomach, resulting from a fall prone upon a boat—the tumor developed five years later; the third had a severe fall and injured the right side of the abdomen. Severe pains immediately followed (May 1899). On June 19, the same year, a laparotomy was done and a perforated appendix and a purulent peritoneal abcess found. Three and one-half years later he died of cancer of the colon, as proved by autopsy.

Prof. Thiem, who has made a careful study of the question of the influence of injury upon tumor development, was called as an expert in this case. He believed that the state of chronic inflammation which had persisted at the site of the cecum and the neighboring organs after operation favored the development of a cancer, and concluded as follows: "In this sense a relation of cause and effect between accident and the cancerous tumor can be conceived." Conforming to this conclusion, the Imperial Office admitted the existence of a casual relationship between the accident and the death of the victim.

Segond cites other cases, which, however, I will not quote. Assisted by Jeanbrean, Segond made a study of sixty-one papers and reports on the subject of the relationship between accident and cancer. These bibliographic researches show 600 observations, 356 of which were considered by their authors as having an undoubted clinical value. He, however, believes that none of these observations is absolutely conclusive, and almost all are incomplete. They fail in part in the fundamental point, in not telling about the condition of the region injured, prior to the accident, and the greater part of them are lacking in details as to the degree of the traumatic violence, the exact date of the appearance of the tumor, and its histological examination. If one were attempting a strictly scientific demonstration, to which no objection could be made, on the basis of these cases, one could not find in these 356 observations a single one in which the

traumatic origin was beyond dispute, as in no case was there a medical examination of the parts prior to the accident, which would preclude the chance of the existence of the tumor before the accident. Segond further addressed personal communications to 600 French and foreign surgeons, getting, however, only 23 replies, and states that 6 of these had not formed an opinion; 4 pronounced themselves very skeptical, while 14 expressed a more or less positive belief in the casual relationship between accident and cancer, and based same upon a series of cases which were briefly recorded.

The criticism that I made of Phelps' study of the question holds true largely in the cases of Segond's more elaborate paper. They both attempt to settle the question by a study of a large number of statistics of other men, rather than by the presentation of new and original facts. They both assume—before accepting the fact of the causal relationship between injury and tumor development—that it is necessary to offer a perfect explanation of such relationship. The question of the causal relationship between trauma and cancer should be determined by a careful scientific and judicial study of all the facts bearing on such relationship. That is a question entirely independent of our ability or inability to offer a satisfactory explanation as to the nature of such relationship.

Both Phelps and Segond make too great an effort to discredit the direct statements of intelligent patients. When a woman of more than ordinary intelligence strikes her breast against a sharp corner of a bureau, causing the characteristic signs of a local contusion (ecchymosis and tenderness); when a careful examination of the place immediately after the injury fails to reveal the presence of any tumor, but one or two or three weeks, or a month later, a hard tumor develops at exactly the point of injury, the supposed causal relationship may, with Phelps, be attributed to the "unreliability of patients' logical processes, which have hypnotized the

attending physician into accepting the improbable assertions as undoubted facts." But when, in the case of a fractured humerus in a man in perfect health, we have an *x*-ray photograph taken immediately after the fracture, as in my case, showing absolutely normal bone structure, and a few weeks later another photograph shows a typical sarcomatous tumor developing at the exact site of the fracture, and when subsequent operation with microscopic examination prove the correctness of the diagnosis; and again, when a surgeon makes an incision in the inguinal region for the operation for inguinal hernia, through absolutely normal structures, and four weeks later there develops at the exact site of the incision, involving all the layers of the scar, a rapidly growing round-celled sarcoma—we have facts which in no way depend upon the logical or illogical processes of patients, and the explanation of which demands something better and more profound.

Here we have a medical examination by competent surgeons immediately before the trauma or tumor development, and in a few weeks thereafter—not an indefinite number of years, but a few weeks afterward—we have the development of a highly malignant tumor at the exact site of the injury, and the histological structure of this tumor in every case demonstrated by microscopic examinations made by competent pathologists.

My series of cases contain a large number of other cases almost equally conclusive. If, then, we have even a few cases that fulfil every condition proposed by Segond and others, and which must be admitted as proving a direct causal relationship, it is perfectly logical to believe that in most other cases in which circumstances did not permit of the fulfilment of all these conditions, especially the medical examination directly prior to the injury, the trauma played the same role in the tumor development.

The majority of those who admit an injury as a direct or inciting cause assume the presence of an hereditary influ-

ence or some other predisposing cause. Our knowledge of heredity is at present extremely vague, and the courts in France and Germany have refused to consider it in such cases. I will only say that in my own cases the proportion of patients with a history of cancer in some member of the family (heredity) was much smaller in traumatic cases than in the cases in which there was no antecedent trauma.

Personally, I believe—and more strongly with increasing experience—that all types of malignant tumors are of extrinsic origin. It is not improbable that what we have hitherto included under the vague term of hereditary influence may some day be proved contagion, or virus, as has already been done in tuberculosis.

Whether we accept the parasitic theory of cancer, or still believe in its intrinsic origin, we must admit that trauma plays a direct and important part in the development of cancer. The argument advanced by some of the writers, that if such were true, all cases of trauma, or a large proportion of cases, ought to be followed by cancer, is not logical. If 50 people were plunged into an icy pond and only two developed pneumonia, by the same reasoning we might say, because 48 remained well, the shock and exposure were not causative factors in the deveolpment of the pneumonia in the two who contracted it.

The great argument advanced by Segond against the admissibility of trauma as a causative factor in malignant disease is the absence of any definite knowledge of the condition of the parts prior to the accident. In order to have such knowledge scientifically acceptable, he believes that there should be evidence of a medical examination of the locality prior to the injury, and such evidence, he states, is entirely lacking, there being no such cases.

My own series of cases supplies this deficiency in at least four instances:

1. The case of the sarcoma of the humerus; injury producing a fracture of the upper and middle third; *x*-ray showing

absolute normal structure of bone. Six weeks later another *x*-ray showing a well developed sarcoma at the exact site of the fracture.

2. Sarcoma in the groin, starting at the exact site of a hernia incision made four weeks before.

3. Sarcoma, starting in the fascia about the external malleolus three weeks after the trauma incident to the stretching and tearing of the fascia and ligaments, due to the forcible correction of a flat foot.

4. Sarcoma of femur in a girl aged nine years, the daughter of a surgeon.

Phelps quotes Billroth: "In no single instance has a tumor been caused intentionally by chemical or mechanical irritation." Yet, at the very time when Phelps' paper was being published, Clunet, of Paris, was actually producing a malignant tumor in a rat, experimentally, by the irritation of the *x*-rays. Clunet subjected a certain definite area in the rat to periodical and prolonged exposures to powerful *x*-rays, allowing the ulceration to heal before the next irritation. At the end of five months, the ulcerated surface, instead of entirely healing, became greatly thickened and soon developed into a malignant tumor, which killed the animal. Furthermore, the large number of cases of cancer—epithelioma or carcinoma—of the hand, in *x*-ray workers, directly disprove Billroth's statement. The fact that they were not produced intentionally none the less prevents us from classing them as caused by mechanical or chemical irritation. Phelps states that these "tumors (examples of acute traumatic malignancy) in the great majority of cases, if not in all, are sarcomata, as were both of Billroth's and all but two of Coley's."

The statement as regards my own cases is extremely misleading, inasmuch as the subject of the paper from which the cases here quoted were taken was "The Influence of Injury upon the Development of Sarcoma." The paper dealt with sarcoma alone, simply referring to two striking

examples of acute traumatic malignancy in sarcoma, without giving any analysis or even the number of cases of trauma associated with carcinoma, of which it had a large number even at that time. That just as striking examples of acute traumatic malignancy occur in carcinoma as in sarcoma, a glance at my series of cases will show.

CASE I.—*Sarcoma of the Humerus.* Mr. L., aged thirty-five years. No history of cancer in the family; a man of splendid physique, six feet tall, weighing 180 pounds. Early in January he fell and received a spiral fracture of the left humerus at about the junction of the middle and upper thirds. He was treated at the Hudson Street Hospital, and then returned to Baltimore, where he was treated by Dr. W. A. Fisher. An *x*-ray, taken at this time, showed a spiral fracture without any trace whatever of a new growth. Two to three weeks later he began to have severe pain at the site of the fracture. Later, another *x*-ray photograph was taken, showing that in the meantime there had developed a well-marked tumor, apparently a sarcoma, involving both the central portion and the periosteum. The growth increased rapidly in size and was accompanied by very severe and constant pain. In June, 1910, an exploratory operation was performed by Dr. J. M. T. Finney, who found a large sarcomatous growth, involving both the central and periosteal portion of the humerus and extending from about the junction of the middle and upper thirds nearly to the head of the bone. The bone was completely destroyed; a pathological fracture had occurred, and there was a flail joint. The central portion of the tumor was curetted; in Dr. Finney's opinion amputation offered no hope of a cure. A few days later he came to me for treatment with the mixed toxins. The treatment was begun on June 16, 1910, and continued in small doses, most of them being given systemically, in the pectoral region and a few in the arm. There was slow but steady decrease in the size of the tumor and immediate cessation of the pain, which had been constant

from the first appearance of the tumor. The shell of bone about the tumor, which had undergone spontaneous fracture, gradually became harder with the formation of new bone, and within a few weeks complete union had occurred. The large cavity gradually filled up with granulations. Several curettements showed the material to be sarcoma of the same type as the original tumor, namely, spindle-celled. The pathological examinations were made by J. C. Bloodgood, of Johns Hopkins, and also by James Ewing, professor of pathology at Cornell University Medical School.

Another *x*-ray examination, in the latter part of 1910, showed that the newgrowth had apparently entirely disappeared, and there was firm union of the arm. The patient's general condition was excellent. In November the granulations began to increase again in size and, in spite of curetting, quickly recurred. An *x*-ray taken in December showed a small shadow starting in the periosteum, in the axillary region, and I finally decided, early in January, to do a shoulder-joint amputation. This was performed at once, and the patient is at present (May, 1911) well.

The case is here given somewhat in detail for the reason that all the conditions necessary to establish a direct causal relationship between the injury and the development of the growth are present.

CASE II.—*Unique Case of Sarcoma of Jaw and Groin, Having Important Bearing on the Relationship of Trauma in the Development of Sarcoma.* J. R., male, aged six years, was admitted to my service at the Hospital for Ruptured and Crippled, February 20, 1910, as a simple case of left inguinal hernia. The family history was good and he was operated upon by the house surgeon for an uncomplicated left inguinal hernia. The wound healed by primary union and he was discharged at the end of three weeks in perfect condition. April 15, he was readmitted to the hospital, for a large swelling in the inguinal region, directly under the hernial incision, extending from the anterior superior

spine to the upper scrotum, not involving the testicle. The swelling was entirely painless, and was first noticed a week before by the family physician, who had been called in for what was supposed to be an ulcerated tooth, who, on examining the patient, detected this swelling in the region of the hernial scar. He had been a week before to the Presbyterian Hospital Dispensary on account of the supposed ulcerated tooth in the left upper jaw, just mentioned. He was sent to another hospital where they have a dental surgeon, who removed two teeth and sent him home.

Physical examination, April 17, 1910, showed the right upper jaw markedly enlarged, the enlargement being in the alveolar process and not in the antrum; two teeth were absent and two or three others quite loose, but the whole structure was perfectly typical of sarcoma, which diagnosis I made. Examination of the inguinal region showed a fusiform, sausage-shaped swelling, about four and one-half inches long, extending from the left of the anterior superior spine down to the upper scrotum, the most protuberant portion bring directly under the recent scar of the hernia wound. The skin was movable and not discolored; the swelling was non-fluctuating without any tenderness, and exactly like a sarcoma in consistence, rather than hematoma, of which diagnosis had been made by some of the surgeons who had seen him. I made an incision along the line of the cicatrix about three and one-half inches long, and immediately on going through the skin came down upon a structure which was absolutely characteristic of sarcoma, firm in consistence, whitish in appearance, slightly vascular, involving the subcutaneous fatty tissue and extending down to the internal oblique muscle beneath, apparently originating in the fascia of the external oblique, along the line of the incision; it extended the entire length of the incision and into the upper scrotum. I removed a considerable portion of it for microscopic examination, but the wide extent of infil-

tration made a radical removal quite impossible. After closing the wound I then removed, as far as possible, by curette and scissors, the tumor of the upper jaw, which was about the size of a small English walnut. It did not extend into the antrum, but involved the entire alveolar process, nearly to the antrum. This structure also was quite typical of sarcoma. One-half of the portions removed was sent to Dr. Jeffries, pathologist of the Hospital for Ruptured and Crippled, who pronounced both small round-celled sarcoma; the other half of the portions removed was sent to Dr. Ewing, of Cornell University Medical School laboratory, who reported as follows:

"Tumor of jaw is a complex tumor very difficult to diagnose and badly crushed, so that the relations are impossible to reconstruct. I find in it areas of fibrous tissue, eroded bone, spaces lined by cylindrical epithelium, and finally larger areas of malignant tumor tissue in which the cells are large, polyhedral, and densely staining. This is evidently a complex tumor, and the presence of epithelium-lined spaces and dense fibrous tissue suggest that it arose from a remnant of a tooth follicle or from the epithelium of the antrum.

"Without an accurate statement of the parts of the jaw involved, it is impossible to give any report on the nature of the jaw tumor, but it seems quite possible that it is the same sort of a tumor as the growth in the groin.

"The growth from the groin is a lymphosarcoma arising in the lymph node and involving the surrounding fat tissue. Both tumors are quite malignant."

Two other specimens, one from the tumor in the inguinal region and one from the tumor in the upper jaw, were examined by Dr. F. M. Jeffries, Pathologist to the Hospital for Ruptured and Crippled, and Professor of Pathology of the New York Polyclinic Medical School and Hospital, who pronounced both round-celled sarcoma.

This case I believe to be absolutely unique, and I think it has a very important bearing upon the part which trauma

plays in the etiology of malignant tumors. It would seem possible that the sarcoma in the upper jaw was the primary growth, which, however, did not reach sufficient size to call any one's attention to it until after the operation for hernia. The trauma incident to the operation so lowered the vitality or resisting powers of the tissues in the vicinity of the wound that they furnished a favorable nidus for the secondary development of a sarcoma, the causative agent of the sarcoma—whether it be a parasite or infected cell—being carried to this locality through the blood current. These cells or parasites were probably in the circulation before the time of the local trauma, but the normal tissues had sufficient resisting power to prevent a local infection.

The patient was put immediately upon the mixed toxins of erysipelas and Bacillus prodigiosus, the dose being carried up gradually to 5 mm. Before a reaction could be produced, owing to some family troubles, he was taken away from the hospital two weeks from the time of his entry. In this short time, however, the disease had advanced with great rapidity, extending up into the orbit, causing almost complete closure of the eye and also extending up into the glands of the iliac fossa, and caused the death of the patient in three months.

Case III.—*Sarcoma of Ankle, Developing Immediately (within Two Weeks) after Forcible Correction of Flat Foot.* F. K., male, aged sixteen years. Good family history; always well up to December, 1909, when he came to the Hospital for Ruptured and Crippled, service of W. R. Townsend, for treatment of flat foot. Both feet were forcibly stretched by Dr. Arthur Cilly and placed in plaster-of-Paris bandages in a position of marked adduction. At the end of two weeks the bandages were removed, and there was found a well-marked circular swelling, about one and one-half inches in diameter, situated just below the external malleolus of the right foot, at a point where the greatest strain to the ligaments had occurred during the stretching. The

skin was normal in appearance; the tumor moderately firm in consistence, but not bony, firmly fixed to the underlying structures, apparently not connected with the bone. The case was carefully observed by Dr. Townsend, and we both agreed that it was almost certainly sarcoma. The tumor had by this time become two and one-half inches in diameter, with an elevation of three-fourths of an inch above the normal surface; it was firmly fixed to the ligamentous structures. The patient was then referred to my service at the General Memorial Hospital. Under ether anesthesia I attempted to excise the tumor, but as there was no capsule and infiltration of the surrounding tissues in all directions, it was impossible to make a complete removal. It extended down to the bone, but unquestionably originated in the ligamentous structures rather than the bone or periosteum. A good deal of the tumor had to be left behind. The patient was then put upon the mixed toxins of erysipelas and bacillus prodigiosus for two to three weeks, but the tumor continued to grow in spite of treatment. Four weeks later amputation at the junction of the middle and lower thirds of the tibia was performed, and the patient again put upon the toxins as a prophylactic, for three months. He is at present in perfect health, nine months afterward.

(NOTE.—Since this was written he has developed metastases in groin and lungs).

This case is one of the most conclusive as a demonstration of the causative effect of a trauma in the production of malignant tumor. As Dr. Townsend states, "Here we have an example in which a sarcoma developed under constant and minute observation immediately after a trauma, almost as if one had planted a grain of corn and seen it germinate."

CASE IV.—*Subperiosteal Spindle- and Round-celled Sarcoma of Femur.* M. B., aged nine years, daughter of a prominent physician in the South. Patient always in perfect health up to two and one-half weeks ago, when she fell from a bicycle. Ten days later she began to complain of pain just above

the right knee. Physical examination showed a small tumor apparently connected with the femur, just above the inner condyle. This grew very rapidly. Exploratory incision and microscopic examination, made three days later, showed it to be subperiosteal and mixed spindle- and round-celled sarcoma. I saw the patient six days after the tumor was first noticed. Found a bony tumor involving the whole circumference of the lower end of the right femur; more marked on the inner side, extending up for five inches; circumference two inches more than other side. Mixed toxins were given for ten days, but failed to control the rapid increase in size. Amputation within two weeks from time I saw her. Generalization within three months. Death four months from time of injury.

CASE V.—*Sarcoma of the Humerus; Acute Traumatic Malignancy.* H. L. B., male, aged ten years; family history good. Five weeks ago patient fell on the ice and struck on his left shoulder and upper arm. He immediately lost power of the arm, and a medical examination showed a fracture about the junction of the middle and upper third of the left humerus. Three weeks later his doctor found a marked swelling on site of fracture, which he took to be redundant callus. This arm increased rapidly in size, and at my first examination, two weeks later, five months from date of injury, the whole upper portion of the left humerus was enormously enlarged. Skin covered with greatly dilated, bluish veins. Tumor extending inward under the pectoral muscle and backward over to the scapula. *X*-ray photograph showed a typical sarcoma of the humerus at the site of a recent fracture. Two days later had an interscapular thoracic amputation. Patient made an interrupted recovery. Toxins given immediately after and kept up for five months. Patient well February 1, 1911.

CASE VI.—*Spindle-celled Sarcoma of the Breast.* M. L. McL., aged thirty-four years, single, in May, 1906, struck her right breast with a tooling instrument. She had a fear

of cancer, and a short time after the blow began to worry about it. A week later she noticed a small swelling appearing at precisely the point of injury. The tumor could not have been present before the injury, because her anxiety with regard to the matter had made her watch it carefully in the meantime. The swelling grew very rapidly. It consisted of a movable lump attached neither to the skin nor deeper parts, and it was harder than the rest of the breast. Two months later she received three treatments with the *x*-rays in Paris. The tumor continued to grow rapidly, and she came to New York. I saw her in consultation with Dr. Parker Syms, July 23, 1906. Physical examination showed the entire right breast symmetrically enlarged and transformed into a large tumor double the size of the other breast. The tumor was soft and semifluctuating. She had had a temperature of 102° for three to four weeks prior to this time. A portion of the tumor was removed for microscopic examination, which proved it to be spindle-celled sarcoma. There were no enlarged glands. The breast was entirely removed and the axilla carefully cleaned out by Dr. Syms, and shortly afterward the mixed toxins were administered, under my direction, for about a year later. In spite of this a recurrence took place and she died within fifteen months after the operation.

The following case of carcinoma is nearly, if not quite, as convincing. As there is little chance of the man having had a tumor of the face before the injury and not noticed by himself or friends.

Case VII.—*Carcinoma of the Face; Acute Traumatic Malignancy.* L. F., male, aged forty-nine years, was referred to me on June 5, 1908, by Dr. C. A. Bleiler. There was no family history of cancer. The patient had been in perfect health up to May, 1908, when he was struck over the right malar region by a steel lever while at work on a train. (He was a railroad employee.) A swelling developed immediately after the blow; he consulted a physician the same day.

The following morning poultices were applied and these were continued for two weeks. The swelling continued to gradually increase in size, and finally became ulcerated over its central portion. Physical examination on June 5, 1908 (a little over three weeks after the injury), shows the patient of strong physique and perfect general health. On the right side of the face, in the malar region, is a tumor the size of a goose egg, movable upon the deep parts, apparently originating in the muscle and fascia. The skin is very much reddened, and in the centre there is an ulcerated area about one and one-half inches in diameter; free hemorrhage on removal of the dressing; no enlarged glands. Although the case seemed nearly inoperable, I intended to remove the growth, if possible, and operated the following day. It was impossible to remove the entire tumor, and a portion had to be left behind. The patient was immediately put upon the mixed toxins. In July the remaining portion of the tumor could be removed by my associate, Dr. Downes. In spite of these operations and the toxin treatment, the tumor very quickly recurred, and the patient's general health soon became affected. The treatment was discontinued. The disease progressed with great rapidity and caused death within three months from the time of the injury. Microscopic examination was made by W. C. Clark, Pathologist to the General Memorial Hospital, and by James Ewing, Professor of Pathology at Cornell University Medical School, who pronounced the disease carcinoma.

Dr. C. B. Lockwood, in a lecture delivered at St. Bartholomew's Hospital, on June 8, 1910 (*The Lancet*, August 13, 1910, p. 445), on Fibroma, Sarcoma, and Fibromyoma of the abdominal wall, stated, in connection with the information volunteered by one of his patients, that she had received a severe blow at the site of the tumor, two years before: "I do not think it right altogether to ignore this history of a blow or an injury. An injury results usually in the extra-

vasation of blood. Extravasation of blood brings about inflammation, and inflammation brings about tissue changes, and these tissue changes may bring about cell multiplication, and this cell multiplication may run wild and result in the formation of a tumor. I cannot help believing that in the breast a blow is sometimes the preliminary to the formation of carcinoma, because a blow results in the extravasation of blood; an extravasation of blood inflames the breast tissue, and the result is a chronic mastitis. The epithelium of the acini or of the ducts proliferates, just as the epithelium of the tongue does, and goes into the lymph spaces and onward into the lymphatic glands. Seen at that stage, you would say that the patient had carcinoma of the breast. It is conceivable to me that a similar course of events might lead to the proliferation of the connective tissue cells of the abdominal wall and to the production of a fibroma, or even of a sarcoma. There is no evidence that these tumors are ever due to anything introduced into the body. But again, I would not draw too wide inferences from the absence of evidence on this point. Certainly, things introduced into the body can produce tumors of considerable size. The Spirochæta pallida introduced into the body can cause gummata, which have over and over again been mistaken for sarcomata. So that if any of you attempt to investigate the production of sarcomata, you should not, I venture to suggest, ignore those possibilities."

The recent experiments of Carrel, part of which have been briefly published three weeks ago, for the first time showing that human sarcoma cells can be made to grow outside of the human body, throw some light on this vexed question. Such cells grow only under the most favorable environment, the very slightest infection immediately inhibiting their growth, and the patient's own blood plasma being the medium upon which they thrive best. It is not difficult to understand that an injury, and even an insignificant injury, by producing a slight extravasation of blood, may

cause just the culture medium for the abnormal growth of the cells. It should be noted that four years ago Drs. Ewing and Beebe showed that it was possible to keep alive dog sarcoma cells for a period of nearly two weeks.

I have personally observed only very few cases of intra-abdominal cancer definitely associated with antecedent trauma. One of the most striking cases in which I found any connection between an injury and the subsequent development of a tumor, was one in which I was called as a medical expert some years ago. Inasmuch as in this case (Dr. B. Delatour's, of Brooklyn) the relationship was much more definite than in the case cited by Segond, I feel warranted in giving a somewhat detailed history of the case here: E. P. F., male, aged forty-four years. In December, 1898, was in an accident of the Pennsylvania Railroad, being thrown violently against a water tank, striking him in the upper abdomen, causing marked ecchymosis, nausea, pain, and some vomiting of blood, which lasted for two to three weeks. He was confined to the house for about three weeks. He continued to get worse, and in February, 1901, he was seen, in consultation, by Dr. Delatour. No tumor could be felt at that time. In May, 1901, a mass could be made out in the right upper abdomen. An exploratory operation was performed and a large number of tumors of the mesenteric glands were discovered. The patient died of shock following the operation. Autopsy showed the mesenteric glands in the upper abdomen markedly enlarged, some being the size of a hen's egg. The pancreas was likewise involved by similar growths. Microscopic examination showed the growths to be sarcoma. At the first trial in court the jury disagreed, and a settlement was affected before the second trial was called.

Case VIII.—*Intra-abdominal Cancer Following Trauma; Carcinoma of the Ovary.* Mrs. W., aged fifty-seven years; family history good. In the early part of 1909 had such a severe fall upon the ice that she felt as though her bladder

had been ruptured. Three or four weeks later she noticed a lump in the lower abdomen. She was operated upon by Dr. Edward Wynkoop, of Syracuse, New York, March 16, 1909; a large tumor was removed from the right ovary. Microscopic examination showed it to be malignant. In July, three months later, a very extensive recurrence was found occupying the whole lower abdomen. This increased very rapidly in size. I saw the patient in August, 1909, at which time the whole abdomen was filled with a large tumor apparently connected with the uterus. Had the appearance of carcinoma rather than sarcoma. Toxin treatment was tried for a number of weeks, but patient showed no improvement. Death occurred a few months later.

The medicolegal aspect of the question of the relationship of trauma to the development of cancer has been very carefully considered by Segond. He believes the following to be the most important points in this connection:

1. Age of person injured.

2. Predisposition, both general—*e. g.*, hereditary—and acquired, or local predisposition by way of previous inflammations or irritation. (Predisposition is not considered by the French courts.)

3. The condition of the locality prior to the injury.

As regards age, if younger than the ordinary age for the development of carcimona, the responsibility of the accident would be augmented. This, however, is a special consideration, rarely applicable.

As to the state of the part before the accident, this is the most important of all considerations, and every effort should be made to determine this. In a medicolegal examination the following points should be established:

1. The exact diagnosis of the tumor.

2. What changes may have occurred at the injured site between the time of the accident and the development of the tumor.

3. The exact interval that elapsed between the injury and the development of the tumor.

Segond gives five so-called guarantees that he regards necessary to establish the connection between the injury and the tumor:

1. The authenticity of the trauma.
2. Sufficient importance of the trauma.
3. The integrity of the part prior to the injury.
4. Correspondence of the tumor to the exact site of the injury.
5. A late appearance of the tumor, not too remote from the time of the accident to be reasonably associated with it.

The interval elapsing between the injury and the development of the tumor Segond regards as an exceedingly delicate question. Certain authors have put into exact figures the time during which the tumor should develop to be reasonably associated with the injury.

René Sand states that in sarcoma the interval should be between three weeks and a year; in carcinoma, from six weeks to a year; in glioma, from one month to six years; other tumors, from three weeks to two years.

Machol states that a sarcoma of traumatic origin should develop three weeks or more after the accident; a carcinoma, up to two to three years or even later. Heckinger estimates two years as the extreme limit within which a trauma can be reasonably regarded as playing a causative role.

Segond regards any absolutely definite time limit, as attempted by the preceding writers, to be of no value. According to the same, he says, one might have to rule out a sarcoma which developed immediately after a traumatism. To the question, "Should one rule it out?" he replies: "By no means; nor, inversely, can we rule out injury as a causative factor in epithelioma which resulted more than three years after the accident." With this I certainly agree.

A sixth guarantee, regarded of considerable importance by some writers, is the continuous presence of pathological manifestations, such as pain, swelling, hematoma, etc., at

the site of the injury up to the time of the appearance of the tumor.

Segond would add a seventh guarantee, namely, a histological verification of the cancer. This would, of course, mean its removal by operation.

In conclusion, he states that when these seven conditions just described have been fulfilled, one is able to accept the responsibility of the accident; and even when the guarantees are reduced to the first five, the same conclusion would hold before the law, and we have the right to award an indemnity, although we may still entertain scientific doubts.

My own experience with the medicolegal side of this question is confined to three cases:

CASE IX.—*Sarcoma of Forearm, Spindle-celled.* Mrs. B., aged thirty-eight years; had always been in perfect health; no family history of cancer. During an ocean voyage was struck over the middle of the upper part of the forearm by a falling washbowl in the cabin, causing a slight bruise. This disappeared. Two to three weeks later, at the exact site of the injury, there developed a small, hard tumor, which rapidly increased in size, and was removed when it had reached the size of an olive. Microscopic examination proved it to be spindle-celled sarcoma. It recurred locally several times, and in spite of toxin treatment and amputation at the shoulder-joint, proved fatal within two years.

Suit was brought against the steamship company. Two trials resulted in a disagreement of the jury; at the third trial the jury gave a verdict of a large sum in favor of the plaintiff.

CASE X.—*Sarcoma of the Retroperitoneal Glands Involving the Pancreas.* E. P. F., male, aged forty-four years. December, 1898, in a railroad accident, was thrown violently against a projecting water tank, striking upper abdomen. Some vomiting of blood, pain, and nausea, lasting from two to three weeks. Patient was confined to his house for three weeks. Next two years was disturbed by epigastric pain

and vomiting, sometimes blood. Careful examination by Dr. Delatour, February, 1901, showed no tumor. Two months later, tumor could be felt in right upper portion of abdomen. Exploratory operation showed a large number of tumors in mesenteric glands. Patient died of shock following operation. Autopsy showed glands in upper abdomen greatly enlarged. Microscopic examination of tumors showed them all to be sarcoma.

Case tried against the Pennsylvania Railroad resulted in a disagreement of the jury. It was finally settled out of court.

Case XI.—*Carcinoma of the Liver, Primary, following Severe Injury.* J. T., male, aged thirty-five years; always enjoyed good health until December, 1909, when he was injured in a train collision in which the car was nearly telescoped. His injuries consisted in severe and very extensive general contusions, principally of the head, spine, and sacrolumbar region. He was unable to walk after the accident and remained in bed for four and one-half weeks. It was at first believed that he suffered from a fracture of the spine. He gradually became stronger so that he was able to walk moderate distances, and on March 24, 1910, when I first examined him, he could walk about a mile. He then had lost twenty-four pounds in weight and suffered constant pain in the back. Physical examination at this time, three months after the accident, showed the following: Weight had fallen to one hundred and eleven pounds (normal weight, one hundred and seventy-five pounds); the skin was soft and flabby, showing evidence of rapid loss of weight. Temperature, 99.5°; pulse, 88; knee-jerks exaggerated; sensation normal. Examination of the abdomen showed nothing abnormal, except very marked rigidity in the muscles of the upper abdomen, particularly in the recti muscles. There was marked tenderness in the dorsolumbar region and spine. The *x*-rays showed an abnormality in this region of the spine, but no evidence of a fracture.

I made a second examination of the man on June 28, 1910, three months later, and found him to have gradually failed since the first examination; his weight had fallen to one hundred and six pounds. He was markedly emaciated, somewhat cachectic in appearance; he could still walk, but was rather feeble. Patellar reflexes were still much exaggerated, and sensation was considerably diminished in thighs and legs. Examination of the upper abdomen showed, in addition to marked rigidity of the recti muscles, a hard swelling in the epigastric region, a little to the left of the median line, apparently intra-abdominal. My notes of the case state: "The tumor is apparently located in the stomach or the omentum overlying the stomach, and is in all probability of malignant nature." In my diagnosis, I stated: "I believe that the claimant is suffering at present chiefly from a tumor of the stomach and omentum, probably malignant in nature. He will probably not live more than six months." The patient died three months later, and autopsy showed an extensive carcinoma, apparently primary, in the stomach, but invading the liver.

Case never came to trial for the reason that he resided in a State where they have the peculiar law that no damages can be obtained, when the next of kin is a non-resident or an alien. This was so in his case.

While it is impossible to say that the injury in this case was the cause of the development of the tumor, the probabilities in favor of a causal relationship are much stronger than in many cases in which such relationship has been accepted abroad. Here we have a man in perfect physical condition prior to the accident, direct evidence that he suffered from extensive contusions, rapid and continuous failure of health immediately after the accident, marked rigidity of the epigastric region three months after the accident with the development, of a large-sized malignant tumor found six months later, in the same region.

The following case, I believe, furnishes the most positive

proof of any that has yet been published of the causative effect of injury in intra-abdominal malignant tumors. I owe it to the courtesy of Dr A. T. Bristow, of Brooklyn. It corroborates, in a way, the important role which hematoma may play. In this case we have a careful examination (by exploratory operation) of the injured parts, two days after the injury, made by a very experienced abdominal surgeon. Three months later we have a second exploratory operation made by the same surgeon, who then found an extensive sarcoma to have developed at the site of the trauma.

Case XIa.—*Intra-abdominal Round-celled Sarcoma, Acute Traumatic Malignancy.* H. L., female, age five years, while playing with another child, January 14, 1911, was pushed violently against the corner of a table, injuring her abdomen. This caused considerable pain and some nausea. Two days later, her symptoms becoming more serious, Dr. A. T. Bristow, of Brooklyn, was called in by Dr. J. A. McCorkle and performed an exploratory laparotomy. He found a large hematoma in the meso-colon at the hepatic flexure. Two inches of the bowel at the flexure was deeply and sharply stained but there was no devitalization of the gut. The peritoneal fold was incised and a mass of blood clot evaculated. A bleeding mesenteric vein was found and tied; a drain inserted and the abdomen was then closed. The child made a prompt recovery, but in the latter part of February, four to five weeks after the injury, the mother noticed enlarged superficial veins over the hypochondriac region. Three days later Dr. McCorkle was called in again to see the child. He discovered a large intra-abdominal tumor at the site of the injury. The growth increased in size with great rapidity, and on March 27, 1911, two and one-half months from the time of the injury, Dr. Bristow did a second exploratory operation, and found nearly the whole abdominal cavity filled with sarcomatous tumors, apparently originating at the site mentioned, involving nearly all the mesenteric

and retroperitoneal glands. The wound was closed, as it was impossible to remove more than sufficient for microscopic examination. The child was extremely cachectic, and has been rapidly growing weaker daily. I saw the patient by the courtesy of Dr. Bristow on April 15, 1911, and found her in a condition of extreme emaciation. The superficial abdominal veins were greatly dilated, and the whole abdomen enormously distended; large tumor masses could be felt in all parts of the abdomen. Prognosis, two to three weeks of life.

During the discussion at the French Congress of Surgeons, in 1907, Professor Thiem, of Gottbus, stated that Virchow thought that irritative causes must be of very great importance in the origin of abnormal tissues, especially in the cause of cancer. Among these irritative causes are chronic inflammation, cicatrices, bacterial irritation, and, more rarely, a single trauma. Theim admits that the cause of carcinoma is still plunged in darkness. We cannot, for this reason, fail to recognize from clinical observations that, in rare cases, cancerous tumors may develop at the site of an injury not only after prolonged and repeated injury, but also after a single trauma. Just how they do originate we do not know. He believes that it is impossible that a trauma determines the site of a metastatic growth; that is to say, that a bruised or contused point may furnish favorable ground for the development of a cancerous embolism. The transported cell of the carcinoma is in need of living tissues for continuing its development.

My own case (Case II), proves the direct opposite of this contention, at least for sarcoma.

In connection with the medicolegal aspect of the question of the influence of trauma upon tumor development, Thiem (Second International Conference for the Study of Cancer, Paris, October 1 to 5, 1910) states that, inasmuch as the true cause of cancer is as yet shrouded in darkness, it is all the more important to investigate the contributive

causes, such as trauma, (acute, repeated or continued), heredity, contagiousness, etc. Among the various contributive causes he considers as deserving of special consideration the determination of the influence of a single blunt or acute trauma upon the development of a cancer. He holds that *every wound*, whether it heals by primary union or not, or whether it result in abscess- or fistula-formation, may contribute to the development of a cancer by virtue of the inflammatory irritation and cicatrization, and he also believes that the same conditions obtain in cases of blunt injury in which the *skin or mucous membrane remains intact.* Here too, he states, we have to deal with processes of inflammation or restitution which are capable—same as in an open wound—of acting as an irritant upon the tissues. However, there is a difference. The comparatively favorable course of subcutaneous injuries implies a more rapid healing process. It is not to be assumed that in such cases as heal without leaving any anatomical changes a condition of irritation sufficient to appreciably contribute to the development of a cancer should persist. He therefore believes that a causative relationship between such blunt trauma and the development of a cancer at the site of the injury may be ruled out after two years from the time of the injury, provided, of course, that a true healing, a *restitutio ad integrum*, have been obtained.

Thiem places emphasis upon the point that the irritation caused by a trauma, is but one of the auxilliary causes, though perhaps the most important, in the development of cancer. That the main cause—the as yet "unknown quantity" must be added, is shown by the following case of Biegel's: In a man, aged seventy-four years, both of whose feet had been operated upon at Lisfranc's joint, during childhood, a cancer developed in the cicatrix of the right side, and on the left a cornu cutanea.

Röpke (*Habilitationsschrift*, 1905) tries to throw some light upon the question of the significance of trauma for the

development of carcinoma and sarcoma. He bases his observations on a study of the material at the Surgical Clinic at Jena. His statistics show that in a series of 800 cases of carcinoma, plus a large number of cases in which the carcinoma developed as a result of chronic irritation, only 19 were caused by one single trauma. In a series of 198 cases of sarcoma, chronic irritation was the cause of the disease in 28 instances, a single trauma in 19 cases, showing trauma to be an important factor in the development of these tumors, and showing, furthermore, that in the case of sarcomas the single trauma plays a more important role, while in carcinoma chronic irritation seems to more often be the cause of the disease. These facts, he believes, speak strongly in favor of Virchow's irritation theory, which, contrary to Billroth's, does not assume a predisposition or specific diathesis for the tumor formation, but rather favors the idea of a local disposition which may be either hereditary or acquired.

Röpke holds, however, that, in addition, a disposition of the entire organism as well as a family disposition has to be considered, same as in the case of infectious disease.

At the close of his article, Röpke reports two cases in which the influence of a trauma in the localization of a metastatic sarcoma could be clearly proved. In both cases a tumor developed at the exact site of contusion within one week from the receipt of the injury. The originally small metastatic tumor gradually increased until it far exceeded the primary growth in size. He calls attention to the great similarity existing between these cases and the development subsequent to a trauma of osteomyelitis and tuberculosis, in which, so frequently, most insignificant injuries furnish the exciting cause for the localization of the infection.

Ziegler (*Münchener med. Wochenschr.*, 1895, p. 621,) gives an analysis of 170 cases of carcinoma, of which 37 cases gave a history of a single antecedent trauma, 22 per cent. He also quotes Estlander, who reported 59 cases, with 15 single antecedent traumas, or 25.4 per cent.; Snow, with 32

single traumas in 143 cases, 22 per cent.; Henry, 196 cases, with 33 single traumas, 16.8 per cent.

Ziegler has collected 171 cases of sarcoma, *i. e.*, 81 males and 90 females, with a history of a single antecedent trauma in 35 cases, and of chronic irritation (including warts), 32 cases.

The highest percentage of cases of antecedent trauma in sarcoma, especially of the long bones, is that brought out by Samual D. Gross in his classical paper on "Sarcoma of the Long Bones." In 165 cases there was a history of previous injury in nearly 50 per cent.

The most exhaustive paper, dealing with the whole subject of traumatic tumor formation, is the one by Carl Löwenthal (*Arch. f. klin. Chir.*, 1894-95, Band xlix). The paper occupies 200 pages of text and contains a very complete bibliography, comprising 360 references prior to 1895.

He states that on the basis of his material, 750 collected cases plus 50 observed at the Pathological Institute of Münich, the conclusion would seem justified, that external injury may undoubtedly give rise to the development of a tumor, therewith admitting the direct etiological relationship between trauma and tumor formation; 358, or 44.7 per cent., of the cases were carcimona; 316, or 39.5 per cent., sarcoma.

As regards the ages of the sarcoma cases, Löwenthal's statistics show the greatest number to have occurred between the twenty-first and thirtieth years, namely, 65 per cent. of 297 cases in which the age was stated. The youngest patient was five months, the oldest seventy-eight years, at the time of observation by the physician.

The time intervening between trauma and tumor formation is stated in 190 of the cases and ranges from almost immediate appearance of the sarcoma to an interval of forty-nine years, *i. e.*, in 135 cases it was one month or less; 33 cases it was one month to one year; in 22 cases it was more than a year.

In Liebe's table, the proportion of tumors immediately

or soon following a trauma is somewhat smaller. Of 107 cases of sarcoma mentioned in his statistics, definite data regarding the time intervening between trauma and tumor were given in 75, and in these the sarcoma was noticed within one month in 34 cases; within one month to one year in 27 cases; more than a year after the trauma in 14 instances.

Löwenthal points out, as of special interest, one case observed at the Pathological Institute of München, in which a sarcoma of the femur developed in the callus of a shot-wound fracture, with imperfect union, that had occurred eighteen years before. He states he could find but two analogous cases recorded in the literature. Of the 316 sarcoma cases, 216, 68.4 per cent., were men; 97, 30.7 per cent., women; 3, sex not known. As to the kind of trauma, it is seen that in the majority of cases the sarcoma developed from a single blunt injury; 79 times it was a fall; 56 times a kick; 43 times a blow.

As regards the frequency of tumors resulting from a trauma, statistics vary greatly. Liebe, for example, found from the records of the Strassburg Surgical Clinic, May, 1872, to May, 1881, in a series of 343 cases, 37 that were attributed to a trauma, 10.8 per cent. Of these, 221 were carcinoma, with 22 of traumatic origin, 10 per cent.; 42, sarcoma, with 3 due to a trauma, 7.1 per cent.

Wolf, in reviewing the records of the Berlin Surgical University Clinic, reported 82 cases of traumatic origin in a total of 574 cases, or 14.3 per cent., of trauma.; 344 of these cases were carcinoma, with 42 due to a trauma, 12.2 per cent.; 100 sarcoma, with 20 ascribable to an injury, or 20 per cent.

Löwenthal states that all the larger statistics show sarcoma to be the type of tumor which most frequently develops as a result of an injury. He refers to Gross' paper on "Sarcoma of the Long Bones," with a history of trauma in nearly one-half of the cases.

G. Wild, who collected 423 cases of sarcoma, found 15 in which an exquisite trauma was given as the cause.

Kirchner, in his statistical remarks on 76 cases of sarcoma of the long bones, found a trauma to have been the cause of the disease in 10.

Löwenstein (*Beitr. z. klin. Chir.*, 1906, Band lii, p. 780), of Czerny's Clinic, after reviewing the divergent opinions expressed by the various writers upon the subject of trauma as an etiological factor in tumor formation, concludes that there can be no doubt that trauma plays a role in the development of sarcoma or other tumors. The exact nature of the part trauma plays in this connection has not yet been determined, nor have the conditions upon which a tumor should be attributed to an antecedent injury as yet been theoterically defined.

As regards the legal importance of such connection between trauma and tumor formation, Löwenstein states that no general rules can be laid down, but that each case should be separately considered and carefully judged according to the origin of the tumor, its development and course.

In answering the question as to why so few of the many thousands of traumas that occur daily result in a sarcoma or other malignant tumor, Löwenstein offers the following hypothesis: That there must be an individual predisposition to cancer at the time of a trauma that results in a malignant tumor, and this temporary predisposition he believes due to physiological endogenous, or abnormal exogenous conditions in the general health of the individual, or lastly, to abnormal local conditions confined to one organ.

Case XII.—*Extraspinal Sarcoma of the Back.* D. S., male, aged five years. Always perfectly well until June, 1910, when, while playing with some other boys, he was knocked down and run over by an express wagon, the latter passing over his body. No bones were broken, and he was apparently not seriously hurt. Nothing unusual was noted until three months later, when he began to have pain in the left lumbar region. This continued, and gradually increased in severity. January 12, 1911, he was brought to the

Hospital for Ruptured and Crippled. While nothing definite could be made out by a physical examination, in view of the location of the pain, he was admitted on the diagnosis of possible perinephritic abscess.

Early in February he developed gradually increasing difficulty in walking, not so largely due to loss of power in the legs as to the severe pain caused by walking. The patella reflex on the left side began to diminish and was almost lost February 15. Physical examination at this time showed no changes in sensation; slight loss of power in the adductor muscles; on the left side of the spine a very slight fulness could be seen, and also felt on palpation. This fulness was apparently due to some swelling beneath the muscles, probably originating in the periosteum of spinous processes. The clinical diagnosis, of extraspinal tumor, probably sarcoma, was made.

The patient was examined shortly afterward by Dr. Pearce Bailey, who confirmed the diagnosis. The *x*-rays showed no abnormalities in the vertebræ. February 17, under ether anesthesia, I made an incision over the middle of the swelling; cutting through and separating the muscles, I found an infiltrating growth apparently starting from the spinous processes or laminæ of the lower dorsal and upper lumbar vertebræ, to the left of the median line. A portion of the tumor was removed for microscopic examination. Clinically it had the appearance of sarcoma.

This case is a good illustration of what I believe to be true, namely, that the number of cases of known antecedent trauma is really considerably smaller than the number of cases in which such trauma was actually present. The hospital history of this case made no mention of trauma. It was only the day before the operation, on my insisting that a more careful history be obtained from the parents, that the fact was brought out that the child had been run over by an express wagon in June, and yet no mention of it was made in the hospital records.

CASE XIII.—*Sarcoma of the Clavicle.* I. M. V., male, aged sixteen years. In October, 1909, he slipped in going down stairs, and, in trying to recover himself, caught hold of the banister, causing severe strain of the shoulder. Four weeks later he began to have pain and soreness in the same shoulder, which continued to increase. One week later examination by a physician revealed a well-marked fusiform swelling in about the middle of the clavicle. *X*-ray examination, together with the clinical history and physical signs, made the diagnosis of sarcoma clear, and I immediately removed the entire clavicle. The growth proved to be a spindle-celled sarcoma.

CASE XIV.—*Sarcoma of the Scapula.* J. N., male, aged two months. Mother had difficult labor; shoulder strained at childbirth. A week afterward a tumor was noticed in the midscapular region on the right side; this grew rapidly, and two months later was three inches in diameter.

CASE XV.—*Sarcoma of the Lower Jaw.* N. M., female, aged thirty-seven years; family history negative. Ran against wall in the dark, striking right side of lower jaw a severe blow, causing a black and blue area over the whole face. One year later, received another blow in the same locality. Two to three months later, noticed a bony tumor over the ascending ramus of the jaw at the side of the injuries. Operation proved it to be an osteosarcoma.

CASE XVI.—*Sarcoma of the Scalp.* M. C., female, aged thirty-six years. Three and one-half years ago, while leaning out of the window, the latter fell a distance of two feet, striking the top of her head, causing no external wounds, but merely a bruise. Six months later a tumor the size of a marble was noticed at the exact site of the injury. This continued to grow, and when it was three inches in diameter was removed by operation. Microscopic examination proved it to be a round-celled sarcoma. Several operations, each followed by rapid recurrence; death from general metastases three years later.

Case XVII.—*Sarcoma of Supraclavicular Region.* Mrs. J. B., aged fifty-six years; family history good. While drawing water, the windlass fell back and struck her a severe blow over the right shoulder. A few months later there developed a swelling just above the clavicle, which increased rapidly in size until it involved the entire supraclavicular pectoral and deltoid regions, associated with great edema of the arm; very rapid progress of disease; death within a little over a year. July, 1900, condition as shown by accompanying photograph

Case XVIII.—*Round-celled Sarcoma of Thigh.* G. M., male, aged thirty-eight years; family history good. While getting out of a milk wagon, struck right thigh against door of same, causing marked ecchymosis. Three to four weeks later, noticed a small lump in the muscles of the thigh at the exact site of the injury. The tumor at first was very moveable; grew with great rapidity, so much so that it was regarded as an abscess; it bled so profusely on incision that the femoral artery had to be tied later. Rapid recurrence followed several removals; death within a year from the time of injury.

Case XIX.—*Spindle-celled Sarcoma of Thigh.* H. M., female, aged thirty-nine years; family history good. Patient ran against a lounge, bruising right thigh, in December, 1898. Noticed a swelling at the exact site of the injury two weeks later; this gradually increased in size; removed one year later, when it had reached the size of a fist. Rapid recurrence followed operation.

Case XX.—*Spindle-celled Sarcoma of Buttock.* Mrs. J. P., aged fifty-two years; family history good. In September, 1907, fell through broken floor of veranda, receiving a severe contusion of right buttock. A swelling appeared shortly afterward, which was supposed to be a hematoma; this increased in size, and, on removal, proved to be a spindle-celled sarcoma; rapid recurrence; death within less than a year.

Case XXI.—*Round-celled Sarcoma of the Supraclavicular Region.* Miss A. W., aged forty-six years. In February, 1909, a heavy window fell and struck her at about the junction of the middle and inner third of clavicle, causing severe bruises. One week later she noticed a swelling at the exact site of the injury; this slowly increased in size until it infiltrated most of the supraclavicular glands. Microscopic examination showed it to be round-celled sarcoma.

Case XXII.—*Sarcoma of Breast.* Miss G., aged forty-eight years; family history negative. In 1895, fell from bicycle and received a severe blow from the handle bar upon the left breast. Four years later, noticed a small, hard lump the size of a walnut, at the exact site of the old injury; operation two years later; removal of breast and axillary glands.

Case XXIII.—*Multiple Sarcoma; Acute Traumatic Malignancy.* (Case of Dr. Teter's, of Newark.) H., male, aged sixteen years; perfectly well until October, 1909, when he was kicked in the back while playing football. A few days later a small swelling appeared between rectum and coccyx; this grew rapidly; was supposed to be an abscess; operation and subsequent microscopic examination proved it to be round-celled sarcoma. Recurred almost immediately, and within two months thousands of small subcutaneous tumors, varying in size from a shot to a pea, appeared in all parts of the body, together w th internal metastases.

Case XXIV.—*Sarcoma of Scapula.* B. A., female, aged twenty-four years; family history negative. Seven years before the developmen of the tumor, while lying in a hammock, the latter broke down, causing her to fall; she struck with her shoulder blade upon the hard floor; the injury was sufficient to cause her to faint, but she entirely recovered from it and there was no evidence of any tumor until six years later, when a hard swelling developed at the exact spot of the injury. This continued to grow rather rapidly, and, on removal, proved to be angiosarcoma of periosteal origin.

Case XXV.—*Sarcoma of Arm.* Mrs. J. G., aged forty-three years; family history negative. At the age of seven, in an altercation with another girl, was struck upon the left arm. A tumor developed almost immediately; operation; rapid recurrence, and eleven operations were successively performed within the next four years, the last one being an amputation at the shoulder-joint. I saw the patient in March, 1906, at which time she had been in perfect health for thirty-two years. A letter from Dr. Smith, who remembered the case distinctly, states that the disease was pronounced sarcoma.

Case XXVI.—*Sarcoma of the Right Femur.* A. G., male, aged fourteen years. Fell and injured right femur just above knee, January, 1908. Noticed bony swelling two or three weeks later. Grew with great rapidity. Three months later circumference of femur, site of tumor, measured twenty inches. Giant-celled tumor. Grew rapidly worse, causing death within six months.

Case XXVII.—*Periosteal Round-celled Sarcoma of the Femur; Acute Traumatic Malignancy.* M. M., aged fifteen years; family history good. January 20, 1904, slipped and fell, striking on his left knee. No swelling noticed until three days later, when there appeared a hard swelling over the interior portion of the lower end of the femur, just above the joint. This slowly increased in size. For nine weeks he was treated with bandages and splints. Rapid increase in size of tumor. Four months later the left femur shows a fusiform enlargement beginning at the lower end and gradually shading off about seven inches above. Death within a year.

Case XXVIII.—*Periosteal Sarcoma of the Clavicle; Acute Traumatic Malignancy.* J. L., aged eight years; family history good. Had a bad fall from stone fence in October, 1905, injuring shoulder. A small lump appeared in the right clavicle a few days later. Grew with great rapidity. Tumor noticed in the right clavicle three to four weeks after injury.

Fig. 13.—Acute traumatic malignancy three weeks after a kick. (Case LV.)

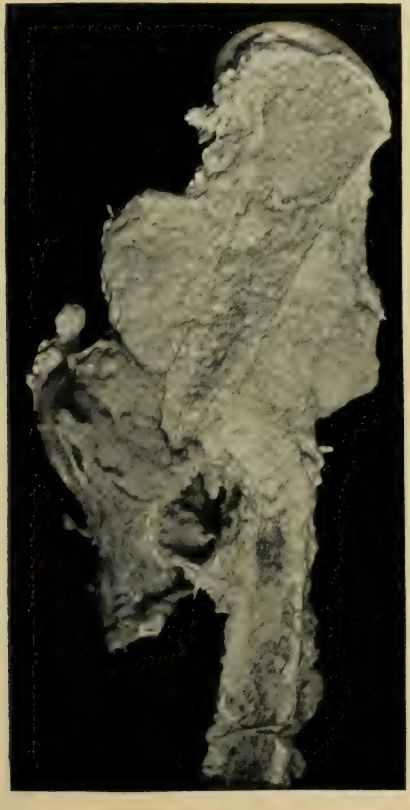

Fig. 12.—Traumatic sarcoma of femur following recent fracture of femur; direct blow from kick of horse. (Case XLIII.)

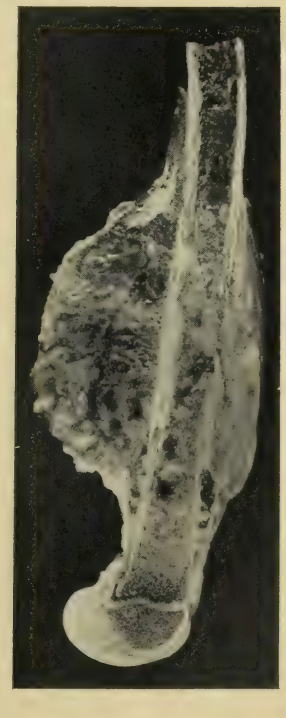

Fig. 14.—Sarcoma of femur developing three weeks after kick. Amputation five weeks from date of injury. Case LV after operation.

Fig. 15.—Shows condition two and one-half months after removal of double carcinoma of breast, with very extensive axillary involvement. Patient gained ten pounds. No swelling of arms. (Case LIX.)

Fig. 16.—Acute traumatic malignant carcinoma developing one month after having been struck on breast by a batted base ball. (Case LXII.)

Operation, partial removal of tumor. Death within five months.

CASE XXIX.—*Sarcoma of the Axilla and Pectoral Region.* W. W., male, aged fifty-eight years; family history: sister died of cancer of the womb. Fell through a barrel, striking the pectoral region against the sharp edge of the barrel, October, 1908. Had severe pain that night, but no swelling or nodule. A day or two later noticed a small swelling, which immediately began to increase in size. The following February, four months from time of injury, it became quite large, and was removed by Dr. Matas, of New Orleans. Recurrence followed, and a second operation was performed May, 1909. Second recurrence promptly followed. Patient soon became inoperable.

CASE XXX.—*Sarcoma of the Testis; Acute Traumatic Malignancy.* F. H., male, aged twenty-seven years; farmer; family history good. Was perfectly well until two years ago was kicked by a horse in the testicle. Small lump appeared very soon after the injury and never disappeared. Did not increase in size until four months ago, when again injured by falling through a hayrack, injuring the same testicle. Immediately after, the old swelling of the testicle began to increase and continued very rapidly. Examination shows right testicle the size of a cocoanut. Testicle was removed. Proved to be round-celled sarcoma. Died one year later.

CASE XXXI.—*Acute Traumatic Sarcoma of the Antrum.* A. Y., male, aged forty-one years; family history good. February, 1901, was struck by the horn of a steer, causing a distinct bruise. The evidences of the bruise disappeared, but at the end of three weeks began to have pain in superior maxilla, and a week later noticed a bony tissue on same side, which proved to be round- and spindle-celled sarcoma. Superior maxilla was removed by Dr. W., St. Paul, Minn., May, 1901. Diseased part could not be entirely removed. The tumor continued to grow rapidly. General condition

became rapidly worse. He was given only a few months to live. Toxin treatment was given by the local physician in 1901. Marked improvement was quickly noted and continued steadily. Result, complete recovery. Alive six years from date of injury without recurrence.

CASE XXXII.—*Round-celled Sarcoma of the Testis; Acute Traumatic Malignancy.* M. M., male, aged twenty-eight years; driver; family history good. Four weeks ago patient fell astride a bar and injured right testicle, no swelling noticed prior to this time. Swelling appeared very quickly, almost immediately after injury, and did not disappear. After a week or two began to increase in size. Two weeks ago patient went to Bellevue Out-patient Department and was tapped for supposed hydrocele; nothing but blood was found. I first examined one month after the injury and found the right testicle enlarged to the size of an orange. Believed to be sarcoma. Two days later I removed the whole testis and cord up as far as the internal ring. Tumor appeared in the abdominal region, causing death five months from time of injury.

CASE XXXIII.—*Sarcoma of the Back; Acute Traumatic Malignancy.* Mrs. L. G., aged thirty-five years. October, 1901, while stooping under a heavy table, she arose suddenly and struck her back against the bevelled edge of the table. It hurt her so much the next day that she could not bend over. Three weeks later she noticed a hard lump at exact point of injury. It was removed, operation, January 22, 1902, three months from time of injury. Tumor continued to grow rapidly. Several operations performed without checking the growth. Patient died from recurrence in the original place, and in the groin, in the early part of 1904.

CASE XXXIV.—*Sarcoma of the Left Groin and Inguinal Glands; Acute Traumatic Malignancy.* E. C. B., male, aged twenty-one years. Struck in the left groin by a lever, January 15, 1908. Swelling appeared in the region at exact site of injury one week later; increased rapidly in size; no

pain; no evidences of inflammation. Two weeks after injury tumor removed by Dr. Carson, Springfield, Mass. Microscopic Examination showed it to be round-celled sarcoma. Recurrence shortly afterward involving the inguinal and iliac glands. Toxins were used; entire disappearance of tumor. Patient well in two and one-half years.

Case XXXV.—*Osteochondrosarcoma of the Ilium.* L. P., aged twenty-seven years. Fell while on roller skates, November, 1906. A few days later noticed a swelling over the right ilium in the region of the injury. Greatly increased in size. October, 1910, four years later, whole ilium and upper portion of femur involved in enormous osteochondrosarcoma, measured twenty-two inches by twenty-one.

Case XXXVI.—*Sarcoma of the Frontal Sinus.* W. J. C., male, aged forty-one years. Three years ago was struck in the left frontal region by a piece of iron weighing one and one-half pounds, falling from a distance of four and one-half feet. This blow immediately caused a swelling over the left eye, near the hair line. Swelling never entirely disappeared. One month later began to increase in size, and continued to grow steadily up to date of my first observation, October, 1906. One year after injury there was a bulging of the left eye. Physical examination at that time showed an extensive inoperable osteosarcoma originating in the frontal bone, probably the frontal sinus.

Case XXXVII.—*Lymphosarcoma of Small Intestines. Intra-abdominal Sarcoma, Result from Associating with Trauma.* P. G., male, aged thirty-two years; family history good. Fell down elevator stairs, April, 1901. He was unconscious. Had shooting pains in the abdomen immediately after injury. Perfectly well up to the time of injury. Noticed hard immovable mass in right groin two weeks later. Began to lose weight at this time. Exploratory operation, six weeks after injury, by Dr. Weir, Roosevelt Hospital. Diagnosis, lymphosarcoma of the small intestine. When I examined him, June 21, 1901, less than a month later, tumor

had increased greatly in size and had involved the abdominal wall, extending from the umbilicus to Poupart's ligament.

CASE XXXVIII.—*Medullary Carcinoma of the Appendix, Cecum, and Ilium.* Miss D., aged fifty years. In March, 1907, fell and injured the right ilium; considerable pain followed shortly afterward, which gradually increased. First operation three months later; second operation (both by Dr. W. C. Young, of Grand Rapids), November 9, 1907. A portion of the tumor was microscopically examined, and proved to be medullary carcinoma. Third operation done by myself in February, 1908; primary growth found to be in the cecum and appendix.

CASE XXXIX.—*Sarcoma of the Breast.* A. M., female. aged thirty-one years; family history good. The patient had always been in perfect health until August, 1896, when she received a blow upon the right breast. A few days later she noticed a lump at exactly the site of injury. This grew rapidly, but it was not painful until November. In December, 1896, it became exceedingly painful and was growing very rapidly. She consulted a physician, who advised internal treatment. On February 8, 1897, I saw her in consultation with Dr. William T. Bull. At this time the entire right breast was occupied by a spheroidal tumor about the size of a large cocoanut, markedly protuberant, slightly fixed to the chest wall, not involving the axillary glands. The skin was thin and glossy, and of a deep purple color over the most protuberant parts. The tumor grew with enormous rapidity, and soon began to slough. The patient died of exhaustion in April, 1897, or seven months after the receipt of injury.

CASE XL.—*Sarcoma of the Breast.* M. M., female, aged thirty-one years; unmarried; family history good. Struck her breast against an iron bracket while acting as a clerk in a drygoods store. She noticed a swelling immediately after the injury, and this continued to increase in size. Five months later the tumor was removed by operation, recur-

rence quickly following; four months from the first, a second operation was performed. The patient died eighteen months after the injury, from a supposed recurrence in the brain, five operations having been performed in the meantime. This case was operated upon by Dr. B. Gallaudet and Dr. W. T. Bull; it was not seen personally by myself.

CASE XLI.—*Osteosarcoma of the Ribs.* G. V., male, aged sixty-two years; family history: father died of sarcoma of the tibia. A year and a half ago, while trimming hedges, he fell upon the sharp point of shears, which ran into the tenth rib on the left side about the mammillary line, causing a fracture, There was marked ecchymosis over this area at the time. Last August a small portion of projecting rib was removed. Microscopic examination negative. Three months ago he developed a large mass in the axillary line a little above the site of the injury, right over the contused area. Patient lost ten pounds in weight. Has increasing weakness and rapid heart action the last few weeks. Gets out of breath very easily. Slightly cachectic in appearance. No tumor. Pulse has been running about 120. Physical examination shows a slight bulging of the chest wall from the nipple nearly down to the costal arch, with complete dulness over the area. Fluoroscopic examination is stated by the physician to have shown a dark mass the size of a fist in this region.

CASE XLII.—*Small Round-celled Sarcoma of the Back.* N. J., male, aged eight years. In the latter part of August, 1901, fell from stoop, striking upon his back. Two to three weeks later, mother noticed a swelling in the left scapular region (the point where he struck), which increased rapidly in size and was soft and fluctuating almost from the start. Four weeks thereafter he was referred to me by Dr. Polhemus, of Nyack, N. Y. Physical examination showed a cystic swelling, the size of an orange, in the left scapular region; fluctuation well-marked. Diagnosis of hematoma was rendered. Under ether an incision was made, and a large

amount of dark bluish fluid was removed with a trocar. Three weeks later the fluid returned and there was evidence of a solid tumor in addition to the fluid. A second operation was performed under ether, and a newgrowth was found which, on microscopic examination by H. T. Brooks, Professor of Pathology, proved to be round-celled sarcoma. It was impossible, in view of the large area occupied by the tumor, to make a thorough removal. The patient was put upon the *x*-ray treatment shortly after the second operation. Under four month's treatment the growth had apparently disappeared. However, three weeks later it recurred, and finally disappeared under the mixed toxins. The boy is perfectly well at present, nine years later.

Case XLIII.—*Sarcoma of the Femur, Following Fracture.* T. H. B., male, aged forty-five years; blacksmith. January 20, 1900, received a fracture of the lower third of the right femur, caused by the kick of a horse; produced no lesion of skin; good union apparently followed; treated by weights for six weeks, with apparently good results. About eight weeks after the injury noticed what seemed to be callus increasing in size; this continued to grow larger and soon became painful. Within six months it had become the size of a child's head. I performed amputation; it proved to be an osteosarcoma, which had occurred at the exact site of the fracture.

Case XLIV.—*Sarcoma of Tibia.* S. F., female, aged forty-six years. Patient had a fall in December, 1909; tumor developed almost immediately afterward.

Case XLV.—*Sarcoma of the Femur.* C. L., female, aged thirteen years. Patient had a fall in June, 1906. She had a little pain afterward, but a swelling was not noticed until two weeks after the injury, when there was found a small tumor in the lower inner portion of the right femur just above the knee. On August 13, 1906, she was admitted to the Hospital for Ruptured and Crippled. At that time the lower third of the femur was much enlarged and the entire bone

was involved by a periosteal growth. Exploratory operation showed it to be an osteosarcoma. Amputation below the trochanter was done a few days later by Dr. Royal Whitman. She was put upon the mixed toxins as soon as the wound had healed. The toxins were continued until January 15, 1907. She regained her normal weight, and was well three and one-half years after.

Cases of Sarcoma Associated with Antecedent Trauma of Special Interest

CASE XLVI.—*Sarcoma of the Tibia, January* 29, 1908. T. L., male, aged eleven months. December 20, 1907, or five weeks ago, while the baby was nursing, a two-year old child seized his right leg and nearly pulled him to the floor, twisting the leg but causing no external bruise. Three days later the mother noticed a swelling in the middle of the right leg apparently connected with the tibia. Three days later she consulted a physician, who stated that it amounted to nothing. Two to three days afterward she again called a physician, who, this time, said it was a sprain and applied a splint. December 20 the child was brought to the Hospital for Ruptured and Crippled and examined by Dr. H. L. Taylor, who put the leg up in a plaster cast, and the mother was told to return in one week. At the end of the week the cast was re-applied, and the child was sent to another hospital for admission, as an indoor patient. The mother was unable to get the child admitted for more than two weeks, during which time the swelling of the leg increased very rapidly, the inguinal glands also became much enlarged, and at the end of three weeks extensive hemorrhages appeared in the right eye, and a little later in the left eye. The patient was brought to me on January 29, 1908, or five weeks after the receipt of the injury. Physical examination showed a tumor involving nearly all of the right

tibia, apparently the fibula as well, reaching nearly from the ankle to the knee; skin was movable, but of a purplish color due to dilated veins. The glands in the groin were markedly enlarged; both eyes showed evidence of extensive hemorrhage into the surrounding tissues; sight not impaired; slight exophthalmos. The child's general condition was so bad that the mother did not think he would be able to stand the journey from Brooklyn. The child was immediately admitted to the Nursery and Child's Hospital, and the toxins were begun in $\frac{1}{10}$ minim doses, with no reaction until the third dose, which was followed by a very slight reaction. The child failed very rapidly, and died February 2, 1909. Such minute doses of the toxins as were given, with practically no reaction, doubtless had little influence in hastening the death. No autopsy was permitted. In the absence of a microscopic examination, it is impossible to say absolutely that the trouble was sarcoma, but the clinical features and the absence of temperature or any symptoms pointing to inflammatory trouble, make the diagnosis practically certain.

Case XLVII.—*Sarcoma of the Humerus.* R. G. H., male, aged forty-six years. Amputation of thigh for sarcoma of tibia. Six years later fell, striking his right shoulder against an iron bed. Four weeks thereafter he began to have pain in the region of the right deltoid; was treated for rheumatism for nearly a year, when a bony swelling became apparent, which gradually developed into an enormous osteosarcoma. This was removed by amputation of right shoulder-joint.

Case XLVIII.—*Sarcoma of Fibula.* Mrs. R., aged thirty-four years. Kicked by a horse in the upper portion of the right fibula, thirteen years ago. Almost immediately afterward there developed a small bony tumor, which was regarded as an osteoma. There was very little increase in size for thirteen years. In the spring of 1910 it began to grow rapidly, and within a few months, became four to five inches in diameter. September 25, 1910, removal of entire fibula. The tumor proved to be a spindle-celled sarcoma.

CASE XLIX.—*Osteosarcoma of Left Humerus.* I. H., male, aged eighteen years; bricklayer. Fell three stories, striking a glancing blow in deltoid region, in the region of the right humerus. Pain set in four months later, and swelling quickly followed. Operation; recurrence in other humerus.

CASE L.—*Sarcoma of Rectus Muscle.* J. O. C., male, aged eleven years. Received a blow upon the abdomen just above the umbilicus in the summer of 1909. Two to three weeks later noticed hard lump in the right rectus muscle, just above umbilicus. January, 1909, operation at the Hospital for Ruptured and Crippled. Microscopic examination by Dr. Jeffries, pathologist of the Hospital and Professor of Pathology, at the New York Polyclinic, showed it to be a mixed-celled sarcoma; the report stated: "For quite a distance beyond the growth proper, the muscle is being invaded by the sarcoma cells, which follow accurately all the ramifications of the areolar interstitium."

CASE LI.—*Sarcoma of Clavicle.* W. F., male, aged thirty-eight years. In December, 1905, while swinging from a trolley car, he grasped the rail with the left hand and received a severe sprain of shoulder. He immediately began to have severe pain over the inner third of the clavicle, which, however, subsided somewhat under massage. One week later he noticed a bony lump in the clavicle, which increased rapidly in size. It proved to be a round-celled periosteal sarcoma.

CASE LII.—*Sarcoma of Right Thigh.* Mrs. G., aged fifty-eight years. Three years ago struck her right thigh against corner of bedstead in the dark. A small lump developed two to three weeks later. There was very little change in size for two years, when she fell on a chair, badly bruising the tumor. It immediately became very painful, and at once began to grow rapidly. Operation, but tumor recurred within three weeks.

CASE LIII.—*Sarcoma of the Femur; Trauma.* W. S., male, aged sixteen years; family history negative. Always had strong, vigorous health until September, 1909, when he was

injured while playing football. After he had fallen, another boy fell upon him, injuring his left hip in the region of the trochanter. He complained so much of it that a physician was called in, but he found only a contusion. All evidences of this entirely disappeared, but in the following June, or nine months after the injury, he began to have so-called rheumatic pains in the region of the injured hip. He was treated for rhemuatism until September, 1910, when he consulted Dr. Frazier, of Philadelphia, who found an inoperable osteosarcoma of the femur at the site of the injury. At the present time, January, 1911, the patient's condition is hopeless.

CASE LIV.—*Sarcoma of the Femur; Acute Traumatic Malignancy.* J. A., male, aged twelve years. Perfectly well until three weeks ago, while coming home from school, was kicked by another boy in the right side of the femur just above the knee. He came home crying, and mother carefully examined, but found no swelling at this time. One week later he complained of having pain in the injured region. Mother again examined him and found a hard, irregular swelling, about three inches above the knee, not movable. This rapidly increased in size, and January, 1907, three weeks after injury, he was admitted to the Hospital for Ruptured and Crippled. Photograph then showed acute form of swelling. Physical examination shows a tumor of hard consistence, apparently periosteal, involving the right femur, beginning about two inches above the upper border of the patella and extending four and one-half inches upward. Mixed toxins were used, and the tumor slightly diminished in size. Amputation immediately followed. Local recurrence. Death resulted four months from date of injury. Here we have one of the most striking examples of acute traumatic malignancy, a definite history of a single trauma localized. Careful examination shows swelling to have developed one week after injury, running a most rapid course, and causing death within four months.

CASE LV.—*Sarcoma of the Femur; Acute Traumatic Malignancy.* E. D., male, aged twelve years; family history negative; personal history: always, in good health up to September, 1906, when he fell from the limb of a tree about six feet high. Three weeks later he began to have pain in the right upper femur; this continued, slowly getting more severe, until October, when he consulted a physician, who treated him for rheumatism. In January, 1907, he noticed a swelling in the upper part of the right femur, which increased very rapidly in size, and there was marked deterioration in general health. I first saw the patient on March 28, 1907, at which time I found a condition well shown by the accompanying illustration. (See Fig. 3). The tumor continued to increase rapidly in size, and caused death a few months later.

CASE LVI.—*Sarcoma of the Radius; Trauma.* M. F., female, aged twenty-six years; family history negative. Several years ago fell and injured left wrist. In the spring of 1908 tripped and fell, injuring the same wrist. Examination by her family physicain showed a fracture of the wrist. Two weeks later she went to the New York Hospital, and *x*-ray examination showed disease of the bone, probably sarcoma. On May 1 an operation was performed by Drs. Pool and Stewart; a central sarcoma was found and curetted out on either side. On May 18 there was no evidence of union, and amputation was advised, but refused. The patient then came under my care for the treatment with the mixed toxins. After six weeks' treatment perfect union had occurred, and the patient was well one year later.

CASE LVII.—*Sarcoma of the Femur; Acute Traumatic Malignancy.* Male, aged thirty-five years; family history good. Kicked by a horse in the middle of the left thigh about six weeks ago. Patient admitted to Bellevue Hospital, February, 1907. Tumor developed in size very rapidly in a few days, occupying two-thirds of the thigh, apparently connected with the bone. The development of the tumor was so rapid that it was not regarded by the attending sur-

geons as sarcoma until a portion was removed and microscopic examination showed it to be chondrosarcoma. Entire tumor had developed within six weeks.

Case LVIII.—*Sarcoma of the Femur; Trauma.* C., male, aged forty-seven years; family history negative. Three years ago he fell upon the ice, injuring the lower end of femur. An *x*-ray was taken and the bone was said to have been cracked. The attending surgeon called it a dislocation of the knee. A year later he had another fall upon the same leg, and again was said to have a dislocation. One year ago, February 29, 1910, he had a third fall, injuring the same knee. The swelling which had developed after the first injury and never subsided began to increase very rapidly in size after the third injury. *X*-rays taken at different times within the last six months showed a marked diminution in density of the lower three inches of the right femur, and expansion of the femur with a sharply outlined tumor-like formation, projecting about one inch beyond the normal outline of the bone. Tumor appeared a few weeks after the injury. The patient came to me February 20, 1911, and I made the clinical diagnosis of sarcoma, which was confirmed by operation and microscopic examination the following day.

Case LIX.—*Carcinoma of Both Breasts.* E. D., single, aged thirty-three years; family history good. Always well up to 1899, when she was run into by a tandem bicycle and thrown violently forward upon the pavement, striking upon her chest and bruising both breasts. Two to three weeks after the injury she first noticed a small lump in the right breast, which slowly increased in size. Two years later a similar lump appeared in the left breast. From this time on both tumors grew very rapidly. The patient was referred to me by Dr. W. H. Carmalt, of New Haven, in September, 1902, who regarded the case as inoperable. The tumor in the right breast was the size of two fists and ulcerated; that of the left breast, nearly as large. Removal of both breasts; proved to be carcinoma; recurred in spite

of immediate x-ray treatment after operation, and proved fatal within six months.

CASE LX.—*Carcinoma of the Breast; Trauma.* A. M., female, single, aged fifty years; family history good. Fell and struck right breast on the corner of a dresser short time before appearance of tumor. Two or three weeks later noticed a small, hard lump on the same breast, site of injury. Six months later breast was removed by operation. Proved to be carcinoma. *X*-rays begun two weeks after operation, and continued for forty-five consecutive days. Seven months later whole right breast invaded with rapid-growing, infiltrating carcinoma.

CASE LXI.—*Carcinoma of Breast; Acute Traumatic Malignancy.* M. M., female, aged forty-six years. May, 1903, was struck in left breast by a baseball thrown one hundred feet. Caused a bruise, but noticed no tumor until five months later, in exact region of injury, a small, hard lump appeared. Grew with great rapidity. Examination April, 1904, showed entire breast involved in typical carcinoma. Tumor extensive; skin as well as pleural involvement.

CASE LXII.—*Carcinoma of the Breast; Trauma.* Mrs. A. M., aged thirty-seven years; family history good. Patient always well until a year ago, when she was struck in the upper part of the left breast by a batted baseball, so severely that it knocked her down. Some pain felt in bruised area, left part of breast. One month later, on exact site of injury, a hard lump appeared, which continued to increase in size. October 20, 1901, I examined her and found the left breast of enormous size, as large as a two-quart measure, almost entirely infiltrated, typical carcinoma. Tumor involving glands, skin, and pectoral region. Patient was hopelessly inoperable.

CASE XLIII.—*Carcinoma of Breast.* Miss E. J. D., aged thirty-nine years; single. Had worn a plaster jacket or aluminum corset for lateral curvature of spine following

infantile paralysis since she was five years of age. Four years ago cancer of the right breast developed; one year later of the left breast.

Case LXIV.—*Carcinoma of Breast.* Mrs. J. W. C., aged forty-three years. Two years ago struck by a tennis ball in left breast, causing her to faint. One year later noticed a small tumor at the exact point of injury, which proved to be carcinoma.

Case LXV.—*Carcinoma of Breast.* S. B., female, aged fifty-three years. Received a blow from a broomhandle in the right breast. Six months later a hard tumor developed at the exact point of injury, which proved to be a carcinoma.

Case LXVI.—*Carcinoma of Breast.* Mrs. D. P. C., aged fifty-two years. Kicked in the right breast by a child two years before.

Case LXVII.—*Double Simultaneous Carcinoma of Breast.* Mrs. N. A. B., aged forty-three years. (Mother has carcinoma of breast at the same time, developing almost immediately after having fallen down the cellar stairs and injured the breast.) Seven years ago the patient was caught in the iron gate of an elevated train, severely bruising both breasts, causing them both to become black and blue. Six years later, noticed retraction of the nipple in the left breast, with a slight exudation. Three weeks later, noticed a simular condition in the other breast. No distinct tumor noticed until September, 1908. I first saw the patient in May, 1909, when both breasts were extensively involved, as well as the glands in both axillæ. (Medullary carcinoma.)

Case LXVIII.—*Carcinoma of the Breast.* Mrs. L. P., aged fifty-nine years. Fell, striking right breast on the back of a chair when a young woman. A small tumor developed immediately at the site of the injury; this grew very slowly and remained practically quiescent until twelve years ago, when it was removed by operation. It recurred ten years later, and finally caused death.

Case LXIX.—*Cancer of Breast.* B. S., single, aged seventy years; family history good. Perfectly well until August, 1905, when she struck the right breast against an iron bed-post, causing a black and blue area. A few months later noticed a hard lump at the exact point of injury. Six months later I removed her breast and axillary glands for carcinoma. The disease recurred within one year and caused death.

Case LXX.—*Cancer of Breast.* Mrs. W. D., aged fifty-nine years; family history n gative. Ran against a hard object, striking upon the left breast, causing it to become black and blue. No lump was noticed until two months later; this increased rather rapidly in size, and eight months later had reached the size of a goose egg. Operation; recurrence; death.

Case LXXI.—*Carcinoma of Breast.* Mrs. H. C. L., family history negative. Well until three years ago, when she was struck upon the upper part of the left breast by a boy, in play. No tumor noticed until two years later, but she stated it was exactly the same spot where the injury was received; grew slowly; first operation, June, 1902; tumor pronounced adenoma; local recurrence 1903, with extension to other parts; typical carcinoma.

Case LXXII.—*Carcinoma of the Breast.* Mrs. C. S., aged forty years, colored; family history good. Received a blow on right breast three years ago. One and one-half years later she noticed a lump on exact site of injury. This increased slowly since. Operation, November 18, 1896, entire breast removed. Recurrence.

Case LXXIII.—*Carcinoma of the Breast.* Mrs. C. S., aged sixty-three years; widow; farmer's wife; family history good. Three years ago injured her right breast while carrying a bundle of poles in her right arm. Six months later noticed small lump on the right breast, exact point of injury. I removed entire breast and axillary glands, which were involved nearly up to the clavicle.

Case LXXIV.—*Carcinoma of the Breast; Trauma.* Miss R. P., aged sixty-five years; single; family history good. Injured left breast falling against trolley car, 1902. One month later noticed depression in the skin. Two months later small tumor developed in this place. August, 1903, ten months from date of injury examination shows tumor of the left breast with characteristic orange-peel appearance. Death followed recurrence one year later.

Case LXXV.—*Carcinoma of the Breast; Trauma.* Mrs. K. R., aged thirty-seven years; family history good. Struck her right breast against a bedstead, October, 1897. A few weeks later there began to be a reddish discharge from the nipple. followed by the appearance of a hard lump on site of injury. Examination, 1898, six months from time of injury shows right breast the size of two fists. Skin infiltrated. Typical carcinoma.

Case LXXVI.—*Carcinoma of the Breast; Acute Traumatic Malignancy.* Mrs. T., aged forty-two years; family history good. In 1892 suffered a severe blow on the left breast. A few weeks after, a hard tumor was noticed in the region of injury. First operation, May, 1893, whole breast removed, and examination showed growth to be scirrhous carcinoma. Recurrence February, 1895. Beyond operation.

Case LXXVII.—*Carcinoma of the Breast.* Mrs. I. S., aged thirty-nine years; family history good. She ran against the corner of a shelf injuring the right breast. Six months later a lump developed on exact point of injury. Operation two years later; recurrence followed within a few weeks, and seen by the writer, August, 1909, she had a large inoperable carcinoma of the left breast and axillary glands.

Case LXXVIII.—*Carcinoma of the Breast.* Mrs. A. R., aged thirty-nine years; family history good. Struck right breast against projecting nail in the wall two years ago, causing pain for two or three days, but no tumor appeared until one year later, when she noticed a small, hard lump about the size of a hickory nut on exact point where injury

had been received. This grew to be the size of a goose egg in about three months. Operation was performed, and microscopic examination proved it to be carcinoma. Operation six months later, and recurrence in four months, December, 1902.

CASE LXXIX.—*Cancer of Breast; Trauma.* Sister M., aged sixty years. February, 1908, suffered a severe blow on right breast, from patient in the hospital. At once said that she felt sure she would get cancer from injury. No lump, however, was noticed until early in April, just two months after injury. This grew rapidly. September of same year, whole breast and axillary glands extensively involved. Condition hopeless.

CASE LXXX.—*Cancer of Breast; Trauma.* Mrs. M. McC., aged fifty-seven years; family history good. Two years ago injured right breast by knocking against bedstead. About two months later small nodule appeared at site of injury; grew slowly. Breast removed a year later, October, 1904, by operation. Hopeless recurrence within three months of operation.

CASE LXXXI.—*Carcinoma of the Breast Resulting from Continued Irritation.* Mrs. K., aged thirty-three years; family history: uncle died of cancer of ribs as a result of fall. Patient stout, full bust. Two months prior to the development of the tumor she changed her habit of wearing a high corset to a low one, upper edge of which pressed against the breast and soon caused an irritation two inches to the right of the left nipple. Two months beginning from date of wearing the corset she noticed a small encapsulated nodule at the point of irritation about the size of a hazel nut. At the end of four months Dr. Parham removed a small nodule which after microscopic examination was pronounced non-malignant. In spite of this, there appeared shortly after a rapidly increasing brawny infiltration starting in the region of the tumor and extending over the whole anterior thorax, from the clavicle down to the costal arch and

outward beyond the axillary line. Glands in axilla became quickly involved. Within six months from time she first noticed tumor the right side of thorax anteriorly from the sternum to the midaxillary line, and from the clavicle nearly to the costal arch, was occupied by an enormous infiltrating growth attached to the chest wall. Patient died a few weeks later.

Case LXXXII.—*Carcinoma of Breast.* Mrs. N. C., aged thirty-eight years; family history good. In May, 1910, struck her right breast against a sharp corner of an icebox. Is sure she had no lump in the breast previous to the injury, and none after same, until three months later. She then noticed a small, hard lump at the exact site of the injury. This was partly removed under cocaine at Bellevue Hospital, and proved to be a colloid carcinoma. Entire breast and axillary glands removed by myself, November 28, 1910, at the Rockefeller Hospital.

Case LXXXIII.—*Cancer of the Breast.* Miss E. B. W., aged thirty years. No heredity; no previous inflammation of breast; kicked in breast by a two-year-old child, causing a black and blue area; very painful for two days. One month later noticed a lump in exactly the same place. Eight months later consulted a physician, who found a tumor the size of a hickory nut. Operation shortly afterward proved it to be carcinoma; recurred and caused death in two and one-half years from the time of the injury.

Case LXXXIV.—*Cancer of the Breast.* J. C. W., family history good. In September, 1905, fell and struck right breast severely against the sharp corner of a wooden box. Breast became swollen and very painful. No tumor found at the time of the injury. The next day a swelling was noticed, which slowly increased in size, and six months later the breast was removed by operation, together with the axillary glands. It proved to be carcinoma; recurrence; death.

Case LXXXV.—*Carcinoma of Breast.* Mrs. D. W., aged fifty-five years; gives following family history: Mother died

of cancer of the stomach, the symptoms of which developed shortly after she was thrown from a carriage, injuring her abdomen, and her physician stated that the injury caused the tumor. An aunt died of internal cancer; one sister died of cancer of the breast at the age of thirty-eight years, the cancer developing very shortly after a blow; breast removed by Dr. Cheever, of Boston; recurred and proved fatal two years from the time of the injury. Another sister died of abdominal cancer, which developed shortly after a blow upon the abdomen.

Case LXXXVI.—*Carcinoma of the Male Breast.* G. H., laborer, aged sixty-four years; family history: sister died of cancer of stomach. Injured left breast near nipple twelve years ago. Six months later noticed a small lump the size of a pea, hard and immovable, at exact site of injury. Slowly increased in size for six years. Plaster was applied six years ago. Tumor gradually increased in size. April 16, 1906, physical examination shows large typical carcinoma two by three inches in diameter, ulcerated. There is over entire extent several hard granular tumors in the axilla and one or two hard glands above the clavicle on the left side.

Case LXXXVII.—*Carcinoma of the Breast.* Mrs. O. B., aged forty-five years. Received a blow in the right breast from the elbow of a child two years ago. Noticed a lump at the site of the injury a few weeks later.

Case LXXXVIII.—*Carcinoma of the Vagina.* S. F., aged twenty-five years; married; one child, aged seven and one-half months. Patient states that she was badly torn at childbirth; began to have trouble shortly afterward. Four months later consulted a physician, who stated she had a newgrowth in the vagina; had two slight operations. At my examination, October, 1908, seven and one-half months from the time of childbirth, the entire vagina was filled with an enormous carcinoma, infiltrating vagina and rectum. Condition hopeless.

Case LXXXIX.—*Carcinoma of the Breast.* Mrs. E. B., aged thirty-nine years; family history: mother died of cancer of the breast. Patient injured right breast in March, 1906, by running against the corner of a table. A lump appeared a few days afterward, at the exact site of injury. This grew rapidly in size, and an operation was performed at Dr. Mayo's Hospital in October 22, 1906. Disease returned in about three months locally and apparently in pleura and lung.

Case XC.—*Carcinoma of the Breast.* Mrs. W. P., aged seventy years; family history: aunt, mother, brother, and sister all died of cancer. Personal history: Six years ago received an injury to the right breast, caused by hitting against a wall. A month later she struck the same breast against an iron faucet. Very shortly after second injury a lump was noticed at the exact site of injury. This grew rapidly in size, and she had it examined by Dr. Robert Abbe, who pronounced it carcinoma. She refused operation, and the tumor was finally removed by plaster. Patient examined by myself five years later, and found free from any recurrence. This case had no microscopic examination of the original tumor.

Case XCI.—*Carcinoma of the Breast.* Mrs. G. H. C., aged fifty-four years; family history good. Husband had epithelioma of lip, which existed ten years before operation was performed. Two and one-half years ago patient slipped on a rug and fell heavily to the floor, striking the right thumb against the right breast, so severely that it caused dislocation of the thumb. A few weeks (less than a month) afterward a tumor developed at the upper and inner side of breast at exact site of injury. Finally, six months after breast and axillary glands were removed by a very extensive operation. A few weeks after operation there appeared a reddish-colored thickening along the whole cicatrix, accompanied by edema of the arm. Examination, March, 1908,

showed very extensive local recurrence with metastasis in the lung and pleura.

Case XCII.—*Carcinoma of the Breast.* A. C., aged forty-three years; family history good. April 15, 1908, struck left breast a hard blow against a blunt piece of wood, which caused no swelling at the time. About two or three weeks later she noticed a lump in the exact site of injury, which grew very rapidly. Physical examination, July 20, 1908, showed left breast occupied by an infiltrating tumor involving the whole central portion of the breast, very hard in consistence; skin adherent. No axillary glands involved. Clinical diagnosis of carcinoma beyond question.

Case XCIII.—*Carcinoma of Breast.* Mrs. E. T. A., aged sixty-two years; married; no children. Five years ago fell and struck breast, causing a distinct bruise. One year later a tumor developed in site of injury, which rapidly increased in size till it was as large as an orange. Breast was removed, and proved to be carcinoma. I saw the patient October 21, 1895, with inoperable recurrent carcinoma. Operation and left breast removed. Microscopic examination proved it to be carcinoma of breast.

Case XCIV.—*Carcinoma of Breast.* Miss L. B., aged forty-five years. Mother died of cancer of breast. Four years ago received an injury by running against sharp corner of a banister and striking her breast. No tumor appeared at site of injury until one year later. In 1897 I removed the breast and axillary glands. Tumor proved to be carcinoma. Extensive involvement of axillary glands. Part removed for microscopic examination proved to be carcinoma.

Case XCV.—*Carcinoma of Breast.* Mrs. N. F. B., aged thirty-eight years; family history good. Four years ago, October 4, she fell and injured right breast. Tumor appeared a few weeks afterward. First operation, 1894, partial excision of the breast by another surgeon; axillary glands not removed. Tumor recurred within the latter part of the year.

Extensive involvment of axillary glands. I performed an operation February, 1895, but was unable to remove entire disease. Patient was put upon the mixed toxins of erysipelas and Bacillus prodigiosus with the hope of retarding the progress of disease. Died of abdominal metastasis.

My own conclusions are as follows: A careful study of the evidence here presented, based upon nearly one thousand personal observations, justifies, I believe, the following:

1. Local trauma of any kind, from chronic irritation to a single local contusion, is not infrequently the direct exciting cause of malignant tumors of all types.

2. That a single local injury may cause a carcinoma as well as a sarcoma is no longer open to speculation. The cases that I have submitted fulfil all the conditions necessary to establish a definite causal relationship between a trauma and the development of a cancer.

3. This relationship in no way depends upon our ability to offer a scientific explanation of it; nor does it depend upon the acceptance of any one of the various hypotheses as to the etiology of cancer. It can be equally well explained whether we accept the extrinsic or intrinsic origin of malignant tumors.

4. *Medicolegal Side.* The medicolegal aspect of this question is as yet in a most unsettled state. While we must admit that trauma often plays an important causative role in the formation of malignant tumors, this relationship must be clearly and definitely established, according to principles and conditions very similar to, if not quite so exacting, as those laid down by Segond, before any legal liability can be admitted.

The following bibliography contains only a few of the more important references. For a more complete bibliography, prior to 1894, see Löwenthal, *Arch. für klin. Chir.*, 1894, 1895, Band xlix.

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RECENT VIEWS CONCERNING THE NATURE AND TREATMENT OF CANCER

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It is my hope that these remarks may be regarded as the continuation of those which I had the pleasure of making upon this same general topic at the last previous meeting. To plunge abruptly into the subject I would raise the following points for discussion. While all, or nearly all, of the present theories regarding the nature of cancer are unsatisfactory there are, nevertheless, certain features which cannot be disregarded. Among these is the apparent lawlessness of cell action within these growths which, nevertheless, includes some features not generally appreciated. We must acknowledge, for instance:

1. General variations in individual susceptibility or resistance;

2. Quite comparable variations in some extrinsic agent (such as we note in colon bacilli), or, more probably

3. Both the above together. Under No 1 are included causes which act upon the various component cells of the part.

4. Wide differences at different periods of life. Too frequently operations on young people are followed by speedy return or rapid dissemination, such as is rarely seen in elderly patients. Essential malignancy is constituted by something far more comprehensive and prevading than mere cell

groupings and irregularities or histological resemblances. That which constitutes in some a rapidly growing cancer is in others, so far as appearances go a much less significant affair—and we know not why.

The effects of heredity can be neither disregarded nor explained, but at best can only amount to the inheritance of some predisposition or favorable soil, or their prevalence in certain family strains. But inheritance has also to do with the so-called precancerous condition, and with so reducing tissue resistance that irritation and injury seem often to be the direct and even the actual cause of cancer.

Despite our failure as yet to recognize and describe one or more distinct organisms it cannot be denied that the parasitic theory, in whole or in part, leaves less in the way of explanation still to be supplied than do any of the others. Nevertheless it will for some time to come prove almost as difficult to reconcile conflicting views and hypotheses as it is in religion or politics. The mental environment of the research worker seems to have almost as much to do with his mental processes and readiness to accept particular views as the physical state and environment of the cancer patient have to do with the course and progress of his cancerous lesion.

When an exceedingly competent pathologist and laboratory director can seriously state: "That the hypothesis of the parasitic origin of tumors has had its day, because subject to direct experimental test it has been found incapable of proof, and inadequate to explain many facts disclosed in recent investigations."[1] he must provoke a sad smile of disagreement among the many operating surgeons and clinicians who come into daily contact with its many manifestations of infectiousness. He aptly illustrates, moreover, the differences of viewpoint between those who see and treat its active expressions among the living and those who see it

[1] Wolbach. Report of Harvard Cancer Commission, 1909, p. 47.

only in the cadaver or as prepared for histological study. He apparently ignores the heart-sickening evidences among the former, and calmly, even wilfully disregards or sets aside all that has been done in experimental laboratories with cancer among lower animals.

Furthermore, while so iconoclastic with the parasitic theory he apparently forgets that it answers more of the mooted questions than any or all of the other theories, since assuming or granting all that has been written, or much of it, concerning the lawlessness of cell activities, their abnormal and changed characteristics, etc., as seen in cancer, not one of the other theories begins to explain satisfactorily why they act so lawlessly. Surely, for such explanation some foreign, abnormal, and extrinsic agency must be presupposed; it is an unavoidable and necessary fundimental concept in our work, and cannot be discarded. And inasmuch as both reason and analogy demand it, why reject it in the case of cancer any more than we did in the cases of syphilis, sleeping sickness, or do yet with such diseases as scarlatina?

There is therefore no need to disregard the belief that somewhere behind the mystery of cancer there lurks a living extrinsic agency—a *contagium vivum*. To hold to this working hypothesis will clarify rather than befog our vista.

With regard then to variations in susceptibility, certain patients evince a very low resisting power, and in them recurrence is an early and frequent event; that is, in certain rare patients operation seems to do harm, by causing a dissemination of rapid and destructive type.

Thus I can never forget a case of a young mother, aged about thirty years, with a rapidly growing, recent, tumor in the breast. This I thoroughly extirpated, removing the underlying muscle and large area of skin, and cleaned out the axilla, and yet saw acute recurrence, in jacket form, almost before the wound was healed. Of this there had not been the slightest previous evidence.

There are two sets of factors at work in most cases, the

external and the internal; as one predominates the other becomes less important. The more extrinsic the cause the more negligible becomes the other. Let us acknowledge then that an epithelial cell once become cancerous assumes an identity and character of its own, and that it *ipso facto* ceases to be an ordinary epithelial cell; even if transplanted—as it is in every metastasis—it retains its acquired cancerous characteristics. Does any other theory explain any more lucidly why this is the case?

It is easier to reconcile than any other theory with a feature which is coming into more and more frequent consideration, namely, the so-called precancerous conditions. Here it is not the disease but the predisposition or favorable soil which is inherited, at least apparently in certain cases. What if those organs which are of latest embryological addition are the most prone to succumb, *i. e.*, appendix, colon, intestinal diverticula?[1]

What, too, shall be said relative to infection from cancerous environment? In my remarks last year I called attention to the facility with which fresh rats developed sarcomatous thyroids after being confined in cages in which many months previously other rats with sarcoma of the thyroid had been kept, though meantime the cages had not been in use. What could be more significant, at least so far as this particular species is concerned? What, too, shall be said of the so-called cancer houses whose existence cannot be denied, though some deny the inferences which naturally arise from their existence?

[1] In chronically inflamed and troublesome appendices, according to MacCarthy, about one in two hundred are carcinomatous. In chronically hypertrophied prostates the proportion is much larger, while in large and rapidly growing goitres 3 to 4 per cent. are cancerous. Sutton found 10 per cent. of fibroid uterine tumors in women over fifty were undergoing some form of malignant degeneration. In 40 per cent. of cases of cancer of the fundus there are associated fibroid changes.

Originally innocent breast tumors notoriously create an environment favorable for cancerous development.

It is often stated that the physicians who come so constantly into contact with the disease never contract it, yet Budd saw in one small cancer hospital five of the medical staff die of cancer within a very few years. (Löwenstein, page 11.) Behla reports 19 cases of apparent infection of previously healthy husbands by cancerous wives, and Gueilliot reports 23 cases of cancer of the penis in husbands whose wives had uterine cancer. Cancer of the tongue has been reported after the use of so-called cancer milk. Guermonprez saw a cancerous wart develop on his own finger after being bitten during operation on a case of cancer of the face and mouth. Budd saw cancer develop on the tongue of a dog whose habit was to kiss and lick the lip of his master who had cancer of the lip.

What is the bearing of all the work recently done and now doing, with inoculations, toxines, vaccines, serums, and the like? Are they not all based on opinions that we have to do with some form or expression of infectiousness? In other words, do they not show that the men who are experimenting with their manufacture or are using them in treating the diseases, are demonstrating allegiance to the parasitic theory, whether they acknowldege it or not?

The following theories of tumor origin are among those now most under discussion and are mentioned simply in order to show what insuperable objections they create. There is, for instance, Waldeyer's theory of equilibrium between epithelial and connective tissue which former is held in check by the latter, this check being relaxed by age. This is sheer fancy given a particular direction in the effort to align it with facts.

Cohnheim's theory of displacement of cells or cell groups from their normal relations during the process of development would call for the presence of displaced adjacent cells throughout the body, while leaving yet unexplained the nature of the stimulus which called them into activity as well as their possibilities, when thus stimulated, for

unlimited growth. It must be said, however, that it would account for the relative frequency of such tumors as hypernephroma and retinal glioma in early childhood.

With some such hypothesis Ribbert combined a dislocation of cells, believing that epithelial cells artifically or accidentally displaced and implanted in connective tissue might thrive and form tumors in their new locations. It is conceivable that epithelial cysts may be formed in this way, but no true tumors have ever been produced by any experiment with implantation or displacement. The Ribbert theory also includes a pre-supposition that some primary change or awakening occurs in the supporting connective tissue. Something of this kind may occasionally occur in embryonal rests; thus carcinoma of the appendix often appears in early life, the majority of cases before forty, the appendix being a rudimentary organ of comparatively recent origin.

There is also the Gametoid or Fusion theory that epithelial cells are penetrated by leukocytes and that by fusion of these elements a hybrid tissue is formed. Here the mitoses vary and the number of chromosomes is reduced, while their form is altered and assumes that of sex cells. The accompanying loss of chromatin is explained by von Hansemann as an anaplasia, which only needs a stimulus or irritation to produce a tumor. Under this term, anaplasia, are included also a loss of power of differentiation and the acquisition of increased power of growth.

More and more of late another feature of comparative novelty has been introduced into the study of cancer, namely, its relation to diabetes. It has been known for some time that malignant tumors are especially rich in glycogen, and, indeed, their glycogen content has been regarded by some as an index of their malignancy. Recently Hirschfeld has noted the relationship between diabetes and neoplasms of the female genitals, which often develop at about the time of inception of the constitutional condition, as if a diminished

tolerance had an unfavorable effect upon carbohydrate metabolism; furthermore, it is known that extirpation of such tumors as those of the uterus and ovaries will often cause improvement in diabetic patients, sugar sometimes completely disappearing from the urine. Therefore, according to Manders and others, certain of these tumors may be regarded as diabetic equivalents.

Role of Irritation and Trauma. The relation between these and cancer is as undeniable as it is yet irregular and variable. Cases showing this relationship I would divide as follows: Into those which furnish evidences of:

A. Intrinsic irritation. This must be regarded as including cases of so-called chronic inflammation as well as other forms of internal "reiz;" cancer of the breast following chronic mastitis; cancer of the pancreas, with or without gallstones or pancreatic calculi; cancer of stomach and intestine after ulceration; cancer of the tongue and mouth following leukoplasia ahd chromic and luetic lesions; psoriasis and various other skin lesions, including especially the keratoses and hyperkeratoses; lupus carcinoma, which is a late lesion, about 1 out or every 10 cases showing this tendency, which is more common in women than in men; cancer of the rectum, which often is the effect of malignant degeneration of previous hemorrhoids.

In connection with these forms of irritation certain other features more or less occasionally operative must not be forgotten, such as the effect of light upon the skin. It is worth while to remember that cattle fed on buckwheat become very sensitive to light rays, and develop skin disease when exposed to them (Loeb). The final stage of light action is the development of cancer in sensitized skins. It is thinkable that some substance is produced which sensitizes the skin and provokes epithelial proliferation.

It is very doubtful whether there is anything peculiar to be ascribed to senility or to senescence of the epithelial cells; changes heretofore attributed to such conditions are more

likely due to persistent and cumulative external agents—light, heat, irritation, etc.—or their necrotizing effects, or else to certain stimulating effects on epithelium. Experience and experiment have shown that certain aromatic amidoörganic derivatives may provoke an infiltrating growth of epithelium into underlying connective tissue, which is equivalent to cancer or to a precancerous condition (Loeb).

B. Extrinsic irritation. Of these there are so many forms that it is worth while to mention but a few illustrations: Cancer of tongue and mouth apparently induced by bad teeth; cancer of gall-bladder following the irritation of calculi; *x*-ray cancer following hyperkeratoses; cancer following burns, or developing on old superficial ulcers; aniline, paraffin, petroleum, and arsenic cancers, some of these occurring in the bladder and being due to the elimination of aniline derivatives in the urine; Kangri cancer (seen in Kashmir) from use of the kangri or earthenware stove worn over the abdomen; betel-nut cancer in the cheek in women who chew the nut to excess; skin lesions, moles, wens, warts, etc., following continuous irritation, and taking the form more often of sarcoma; sailor's cancer, and that of chimney-sweeps; cancer following Bilharzia disease, 50 per cent. of resulting tumors being malignant (Goebel), and due to stoppage of vessels by ova or the parasites whose continued presence leads to proliferating hypertrophy and imperfect repair. Besides these we see excellent illustrations in the horn-core cancer of cattle who are lashed to the plough by a rope around the horns, and, furthermore, in trees and plants where may be seen the simplest forms of tumor or galls due to the presence of parasites. From a study of these xylomata very much may be learned.

Obviously and naturally some of the above mentioned factors really figure in both lists, especially so with the light rays, and of these particularly the short wave and ultra-violet which produce senile keratoma, the Röntgen rays, and even the rays of the sun. What may be effected by a com-

bination is shown in the effect which fluorescent stains are known to possess in sensitizing living cells as well as certain ferments. The effect of irritating dusts may also be manifested externally as well as internally, this being equally true of coal tar products; while the gross effects of irritation produced by friction or by heat are well known.

C. Actual and serious traumatism. Of the effect of these in certain directions Dr. Coley has just given us a most excellent summary. The general subject has recently been treated in an important monograph by Löwenstein.[1]

Let me quote a case which has recently come to my notice which may illustrate the role of trauma alone or of that and infection combined, which latter was easily permitted by the former. A middle-aged nurse in New York City fell into an open coal hole in such a way that one of the steel stays in her corset was forced up into her breast, inflicting a penetrating wound. She had been previously well, and was of good family history. Almost before the wound was closed a cancer had rapidly developed in that breast, and in spite of its early and thorough removal, local recurrence and metastasis had occurred, and when I heard of her a few months later she was dying of exhaustion, with scalp and body thickly studded with tumors which were breaking down, while there was every indication of a similar condition in the interior. In my own experience cases of this character are more likely to be sarcomatous than carcinomatous, and I sometimes think that the former is more rapid and the more to be dreaded.

Epithelium may change its type in consequence of constant irritation or of injury. Thus in the everted uterus columnar epithelium changes to a stratified squamous type, whose outer layers may even undergo a definite horny change. So, too, the epithelium of the conjunctiva and the nasal mucosa may change into a thicker and more stratified form,

[1] Ueber Unfall und Krebskrankheit, Tübingen, 1910. From Czerny's Heidelberg Institut für Krebsforschung.

while horny and desquamated epithelium may collect in so-called cholesteatomata or pearly bodies. Such collections may also be found in the ureters, when calculi are present and in the gall-bladder, with or without calculi. In the respiratory passages papilloma and carcinoma arise in areas which have undergone such changes, *i. e.*, multiple reduplications of squamous epithelium.

On the other hand the change from squamous to columnar type is seen in the bladder and deep urethra, where papillary outgrowths are not uncommon, and when following chronic cystitis they are often associated with malignant degeneration.

All this has been described by Lubarsch[1] under the name "heterotrophic proliferation," implying the occurrence of epithelium where it does not belong, *e. g.*, in the intestines between bundles of muscularis mucosa or quite beneath it. It is most frequent in the aged, and causes great difficulty of diagnosis between chronic inflammatory conditions and carcinoma. Diagnosis is made as much by history and gross appearances as by any method. In a large series collected by Lubarsch were 52 cases of stomach lesions, 32 in the intestine and 36 in the gall-bladder, all consisting of distinct proliferation of epithelium, with either hypertrophy or atrophy of the mucosa as a whole. In 3 out of 5 cases showing heterotrophic changes carcinoma was present. Out of 662 cases of carcinoma of the stomach Haberfeld proved that at least 106, 16 per cent., developed upon a basis of ulcer.

He also proved that in primary carcinoma of the gall-bladder calculi were present in 70 per cent. of cases, while in secondary cancer they are very rare.

Again, Lubarsch and others have shown that the injuries incidental to parturition have a positive influence in the subsequent development of squamous-cell cancer of the cervix.

[1] Ueber heterotope Epithelwucherungen und Krebs., Verhandl. d. deutsch. path. Gesellschft., 1906.

By virtue of the fact that the right primary bronchus makes nearly a straight line with the trachea, the right lung is much more exposed to any infectious process. Out of 146 cases of cancer of the lung collected by Haberfeld, 94 were primary on the right side.

Leaf's studies[1] of breast cancer showed a history of abnormal lactation (excess or deficiency) in 71 per cent. of cases, and of injury in 32 per cent., while in 23 per cent. there was a family history of cancer.

At least 40 cases of *x*-ray cancer are on record, mostly in young people. It notoricusly follows the chronic dermatitis, telangiectases and keratoses which occur only on exposed areas of the body. There is frequently a remarkable latent period, often several years. There is a reversion to an earlier type where, while growth capacity is at a maximum, differentiation is at a minimum and the main changes occur in the deeper tissues of the skin.

Similarity in forms of skin cancer, under various forms of injury points to an identical kind of irritation. According to many they indicate that persistent irritations of the connective tissue which supports the epithelium are responsible for the acquisition by the latter of its malignant characteristics. Unfortunately these conditions cannot be duplicated experimentally, time is a most important element; in *x*-ray cancer perhaps ten years must elapse.

Certain recent discoveries have been made with regard to cancer in fish, and a form of goitrous enlargement which often assumes a sarcomatous form, and which is found to affect only fish in certain pools in various hatcheries, while those in other pools alongside are exempt. When practically all the fish in one pool are infected we naturally look to their environment and its contents for explanation. Gaylord and Marsh have certainly determined this for individual hatcheries. They have found, moreover, that when fish thus

[1] Zeitschrift. f. Krebsforschung, 1907.

affected are put into tanks, and in water containing so small a proportion of iodine or sublimate as to make 1 to 3,000,000 solution the tumors cease to, or do not develop. Moreover, Gaylord took a litter of puppies to one of these infected pools, four of which drank the water, while two drank from an uncontaminated source; each of the four developed thyroidal enlargement, while the other two were exempt. From such facts as these you may draw your own inferences.

Regarding the death rate from cancer. In spite of all efforts to minimize the facts they show that the death rate per 100,000 is certainly increasing, while the total mortality is appalling. Thus, in one year in Japan there were some 25,000 deaths; in New York State the number was about 7000, while the total number of deaths during the same year in the United States was about 40,000. As I have more than once remarked to our own legislators, if 7000 cattle died in our own State from a given disease there would be ordered a prompt investigation, and yet upon the loss of 7000 human beings the legislature looks with apathy or with small interest.

Some interesting cancer statistics have recently come from Denmark[1] from which it would appear that in 102 cases, *i. e.*, 10 per cent. of the total number, there was cancer among near relatives, or in the same family; a fact distinctly stated as not to be interpreted in favor of heredity, but rather as indicating in at least certain families a certain contagiousness. Four per cent. of cases evinced the same thing among persons closely associated, while 4 per cent. of cases also occurred in sisters. In 65 cases, *i. e.*, 7 per cent., of cancer of the alimentary tract one-half of them had near relatives with the same form of cancer. Or, including abdomen and liver, these figures might be placed at 54 out of 76 persons, *i. e.*, 70 per cent. of those thus affected.

The German Cancer Commission, too, have taken the

[1] Zeit. f. Krebsforsch., vol. ix.

ground that since in about 14 per cent. of a large total of cases the parents suffered from a similar disease, this should be regarded as of infectious character. In man we certainly note occasionally peculiar family predisposition to tumors of various kinds; thus, in one family, I have known of 16 instances in two generations. This same thing is noted in small animals.

Treatment. To what extent have we advanced in the therapy of malignant disease? This is a most important question, especially in view of methods of investigation or inoculation which have recently come into vogue.

It was in the Buffalo Laboratory that it was first discovered that the serum of animals that had undergone spontaneous retrogression of inoculation cancer, as a small percentage did, would cause decrease in or disappearance of similar growths in other animals of the same species. It was upon these facts here constituted, by Gaylord and Clowes, that Hodenpyl based his first announcement of success in treating cancer by injection of serum taken from a human case of spontaneous subsidence of this disease. How alluring and yet how disappointing this announcement has proved is a matter of very recent history which must be still fresh in your minds. While it probably contains the germ of a great truth, much time and study must yet be devoted to elucidating the mystery which it contains. In the Buffalo Laboratory, as in others, encouraging results have been obtained by injection of enzymes, in both fluid and solid state, which have been prepared from the tissues of malignant tumors, but all this opotherapy is yet so completely in the experimental stage that one would be wrong in drawing conclusions, or in doing more than testing selected patients during the experimental period.

Of all other internal remedies or drugs and non-surgical procedures I have, with others, for many years regarded *arsenic* as that substance which has more nearly a selective or elective action on the cancer cell than any other. That

others share this belief is shown by the prominence which has of late been given in various parts of the world to what I may call arsenotherapy; in all of which I see only a confirmation of views expressed by myself over twenty years ago. As yet, however, the best that can be said of this is that it is of value in certain cases, and one should never hesitate to combine with it any form of surgical treatment, and to follow the latter with arsenical preparations and perhaps with *x*-ray treatment.

To operative measures we have yet to turn as offering by far the most hopeful expedient in recent cases, and perhaps the only possible one in the late cases. While we all well know that the laity themselves are most to blame in declining to accept these measures, we must yet realize that it is our paramount duty to show them that *danger lurks in delay, and time lost, rather than in the operation itself.*

Excision, then, is the ideal method in theory, if only it can be made radical and thorough, even though necessarily much healthy tissue be sacrificed, in which respect it is perhaps crude; possibly in some cases tissues are sacrificed that might furnish some sort of resistance as against inroads of the disease, while lymph spaces are certainly opened up and fresh infection possibly thus invited, assuming, of course, that there is about the disease an infectious element. (In this respect I would quote myself as stating that for me every metastasis has the force and significance of a fresh inoculation made under favorable circumstances.) Thus, Meller, discussing operations for cancer about the face and lips, shows that local recurrence in and about the scar is much more common and takes place earlier than in the lymph nodes, which means that we often fail to remove all the affected tissues, and that incomplete operations may even do more harm than good. This he concludes is the result when the knife is wielded by an unpracticed, untrained surgeon.[1] All of which goes to show that the technique of

[1] Zeit. f. Krebsforschung, 1907, p. 64.

operations for cancer must be based on the most accurate knowledge of its characteristics; also, as a corollary that all operations which cannot be made complete and thorough should be made with the cautery knife.

And, here, now I may call your attention to one of the strangest inconsistencies in this whole question and controversy, namely, that many of the men who adhere most strictly to these practices and to this improved technique, as well as some of those who are playing with serum or are inoculating various cancer products, still affect to disregard the parasitic hypothesis while yet basing their every precaution upon its truth.

What shall be said of other methods of treatment? There remain to be mentioned the use of *caustics*, the employment of *cathode* and *radium emanations* and *fulguration*. *Caustics* find their principal recommendation in that their resulting reaction serves apparently to block lymph channels and by thus causing violent and extensive reaction produce a sanitary cordon of fresh inflammatory tissue which walls off the area of pathological activity and may also destroy scattered cancer cells. This statement puts them in their best possible light; obviously they are only available on affected surfaces, but the above features are so conspicuously of theoretical advantage that escharotics are beginning to commend themselves again in the hands of educated and trained surgeons. Heretofore they have been too exclusively in the hands of charlatans and quacks who, themselves afraid to operate, have used these substances upon patients who were afraid to undergo operation. Among the escharotics should be included first of all the use of the cautery knife in cases where a clean excision by careful dissection may not seem practicable.

Among them also should be included *liquid air* and *carbon dioxide snow*, the former almost impracticable, and the latter serving admirably in various skin lesions including, conspicuously, lupus erythematosus, and ranging from these

to rodent ulcer and small epitheliomata, including also many nevi and other skin lesions.[1]

Fulguration depends for its efficacy not on actinic or light effects, but on a rude and unreliable cell destruction, which if effective is difficult, elaborate, and painful, and which is usually impracticable because of the expensive apparatus required and dissatisfaction as concerns end-results.

Cathode rays and *x-rays* can be made absolutely destructive to superficial growths if used to excess, but the *x*-ray is in effect a two-edged sword; nevertheless it may be used as the principal agent, as a preliminary therapeutic measure preceding operation, or as a postoperative protection. The first and the third of these uses are, in trained hands, often very successful; the second is a disappointing and even a dangerous measure. Again, cathode rays may be used for their destructive and specific effects, for relief of pain, without reference to the former, and to prompt absorption of exudate of scar tissue. I have convinced myself that they are of great value after operations where portions of the abdominal viscera or of abdominal growths have been removed on account of cancer. Here they, at least, seem to retard recurrence and I repeat, in my own experience, to apparently prevent it. They have, moreover, a special field of usefulness in certain locations, as about the face, the vulva, etc., but they should never be used by those who are not as keenly alive to the dangers as to the benefits resulting from such use. To these dangers which are so well known to you I will not now make further reference.

Radium. On account of its extreme cost radium therapy is not likely to become popular in the near future. In the hands of a very few men, like Abbe, it seems to have accomplished much in a few cases. I have obtained benefit and apparent cure from its use in a very few cases of superficial

[1] See Pisko, New York Med. Jour., February 4, 1911, p. 215.

cancer and lupus. Its use is not attended by risk, but needs to be controlled as does that of the cathode rays.

After all, discussion of the therapy of malignant disease is too much like trying to entertain you with a meditation upon death. There is as yet little satisfaction to be gained by any but the most radical surgical procedure, and this to be completely successful should be early. Finally I am tempted to try to lift from the profession the opprobrium of failure to recognize cancer, especially in its internal forms, at an early enough period to make operation generally successful, by reminding you of that to which I called your attention a year ago, and to which the profession are all too blind, namely, that *cancer as a disease has absolutely no symptomatology of its own. Signs* it has by which it may be easily recognized when superficial, but when within the body cavities it is made evident to sight or touch by unmistakable signs, it is then indeed late to expect a cure from any source.

CONSIDERATION OF THE TECHNIQUE OF THE RADICAL ABDOMINAL OPERATION FOR UTERINE CANCER BASED UPON AN EXPERIENCE WITH FORTY-FOUR CASES

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It is with some hesitancy that I submit a paper dealing with operative technique to a society such as this. My only excuse is that the operation in question is in my opinion undeservedly unpopular in this country and a discussion of the whole question may so change surgical opinion as to lead to renewed attempts to master the technique of the operation. I say this advisedly, for I believe the primary mortality of the radical abdominal operation for uterine cancer has been so high as to lead many surgeons to abandon the operation when more perserverence would have so improved their technique as to lead them to continue with the operation. For it takes courage to perform an operation today which is apt to give over 30 per cent. primary mortality in the first two or three dozen cases. We are not accustomed to such shocking primary results, for modern surgery has been so developed that the ordinary gynecological clinic proceeds with as much precision as exists in a well regulated machine shop. The occasional death only proves the rule. To undertake an operation entailing under the best conditions a primary mortality of at least 10 per cent., and with the inexperienced three or four times as much, is very apt to prove discouraging to the operator and cause him to give up the operation upon one pretext or the other.

At least that was my experience with the advanced radical abdominal operation for uterine cancer. A primary mortality of over 40 per cent. in 14 cases is not conducive to the conceit or happiness of any operator. While I have persevered and have been able to bring down my primary mortality figures to a point where I can disclose them without shame, I still approach each operation of this kind with the greatest respect, for I have learned that things go wrong at the slightest provocation. Hence it has seemed to me fitting to discuss briefly the technique of this operation, which in my opinion is the most difficult in the whole realm of gynecological surgery.

No claim is made for originality in the technique to be submitted. The principles of the operation were laid down long ago by Ries. Each operator has modified the technique, but there have been no changes of any great importance. The clamping of the vagina prior to the removal of the uterus, for example, a modification introduced by Wertheim, while a valuable addition to the technique is not vital to the successful performance of the operation. The radical abdominal operation for uterine cancer is based upon the principle that there should be a wide removal of the diseased uterus. Vaginal hysterectomy had proved a failure because the surgeon, perforce, had been obliged to place his forceps or ligatures close to the uterus through fear of injury to the ureters. Thus cancerous areas were left behind in the broad ligaments with resulting quick return or rather a rapid continuation of the disease. By the abdominal route it became possible to tie the uterine arteries outside of the ureters, and after dissecting out these ducts, to remove the parametrial tissue up to the pelvic walls. Not only this, but through this avenue of approach the upper portion of the vagina could be safely removed and the pelvic glands excised.

The operation has been sharply criticized on the grounds that its technique is too complicated and the primary mortality too high to warrant the procedure. It has been claimed

that it is useless to remove some and not all the pelvic glands; and that since the latter task is impossible it were better to be contented with the safer vaginal hysterectomy. But I have never seen it contended that the basic principle of the operation was at fault; in other words that it would not be desirable to make an extensive removal of the cancerous uterus and its surroundings, if that were possible. To deny this would be to set at naught lessons learned in the surgical treatment of cancer in other parts of the body where wide excision has resulted in permanent cures.

The Technique of the Radical Abdominal Operation for Uterine Cancer. Since the vagina is to be opened from above it is highly essential that this canal and its contents be made as aseptic as possible. With this end in view the cancerous cervical tissue should be removed by the curette and the oozing surfaces seared over with the cautery. This should be followed by the application of strong bichloride (1 to 500) or other antiseptic solutions. In most instances this can be done just prior to the abdominal incision. Rarely it may be deemed best, on account of the anemic condition of the patient, where every ounce of blood lost materially lessens the chances of recovery, to first curette and cauterize, the abdominal operation being performed subsequently. While these measures may not secure an aseptic vagina, practically the latter is free enough from germs so that peritonitis may be avoided if care be taken in the subsequent steps of the operation.

The abdominal incision necessarily must be of considerable length; usually one reaching from the pubes to the umbilicus will not be found too long for the extensive dissection which must follow. I have found the median abdominal incision will answer all purposes, even in fat women. Extensive transverse incisions are mutilating and unnecessary. It is absolutely necessary for the patient at this stage of the operation to be deeply anesthetized and while in the exaggerated Trendelenburg position for the intestines to be

packed away from the pelvis and held upward by gauze packs. Then the patient can be returned to as nearly a horizontal position as will enable the operator to obtain a good view of the operative field while he continues his work. Elsewhere I have explained my views regarding the danger of the sustained exaggerated Trendelenburg position in this operation. Suffice it to say that for this particular operation it is dangerous and should not be employed.

The uterus is now seized and drawn sharply to one side and the ovarian artery tied with catgut well out toward the pelvic wall (Fig. 1).

The round ligament is tied separately also well away from the uterus. After the opposite side has been treated in a similar manner, an opening is made between the layers of the broad ligament so as to freely expose the pelvic vessels and the ureter (Fig. 2). I see no good reason for exposing the ureter by an incision through the posterior surface of the broad ligament as advocated by Wertheim. The ureter is almost always readily seen at the bottom of the space exposed. If there be any difficulty it is easily recognized by the sense of touch and just as easily isolated. It is not to be dissected out from its peritoneal bed from above downward or else its blood supply may be impaired (Sampson).

With the scissors the peritoneum should now be cut upward nearly to the bifurcation of the iliacs (Fig. 3). This further exposes the ureter and enables the operator at this point to make a dissection of the pelvic glands if he so wishes. Personally I prefer to defer the question of the excision of the glands until after the removal of the uterus, for in some instances at this stage of the operation the patient will be in such a serious condition as to lead the operator to abandon glandular dissection. Whether glands should be removed or how extensively are still mooted questions. The uterus and parametria must always be removed.

The uterus is now drawn sharply upward toward the umbilicus and the vesicouterine fold of the peritoneum cut across (Fig. 4). The bladder is now separated from the

cervix by gauze and scissors. Care must be taken at this point to expose the vaginal wall only in the median line. An attempt to separate it laterally in the neighborhood of the ureters will usually lead to the opening of large veins and to considerable bleeding.

The uterine artery is usually easily isolated and tied by remembering that it lies above the ureter. With the latter as a guide the forefinger is passed under the artery which by this procedure is easily separated from the ureter (Fig. 5). The artery should be cut between the two ligatures and the ureter more fully exposed (Fig. 6).

While the ureter has no real sheath in the true sense of the word, the tissues of the broad ligament, especially when indurated, form an artificial sheath about the duct. This sheath should be carefully cut before attempting to dissect away the ureter from its bed in the broad ligament. For this purpose the sharp pointed scissors should be used, the lower blade being inserted along the upper wall of the ureter as it enters the upper edge of the broad ligament (Fig. 7). The ureter should always be isolated by this process toward the bladder, not only because it is handier to work in this direction but because it is easier in this way to clamp the veins which run transversely across the pelvis in the region of the bladder before the ureteral sheath is severed (Fig. 7). This is one of the most important points in the technique, for unless these veins are thus treated there is liable to be profuse bleeding. The operator hesitates to seize the bleeding points for fear of wounding the ureter. The field is obscured with blood and much time may be lost before the hemorrhage is controlled. This should be secured through firm pressure by gauze packs, meanwhile saving time by working on the other side of the uterus or severing the uterus posteriorly. It now can be readily seen why the bladder should not be fully pushed away laterally until after the ureter has been isolated in the way described.

By gauze pressure the bladder should be dissected well upward and the ureter dissected away from the uterus from

a point where it enters the parametrium up to where it enters the bladder (Fig. 8). It will do no harm to dissect out this portion of the ureter freely, provided it is left undisturbed in its upper portion. If it be dissected out from its bed from the brim of the pelvis down to the bladder its blood supply is bound to be interfered with and ureteral necrosis almost invariably follows.

The vaginal wall should be well separated from the surrounding tissues, for it is necessary that at least one inch of the upper portion of this canal be removed with the cervix.

The uterus should now be drawn toward the pubes and the posterior peritoneum together with the sacrouterine ligaments should be cut across. Any adhesions should be severed and bleeding controlled by forceps. The rectum should be pushed downward by gauze pressure, care also being taken to see that the ureters are away from this posterior fold of peritoneum (Fig. 9). However, it is unnecessary to make any further dissection of the ureter, it merely needs to be drawn strongly to the side of the pelvis to be out of the way of the incision of the posterior peritoneal fold.

Preparatory to cutting across the vagina and removal of the uterus, the surrounding structures should be carefully protected with sterile gauze packs. The vagina should be clamped at least one inch away from the end of the cervix, the assistant pushing away the bladder and drawing aside the ureter (Fig. 10).

The vagina should be cut below the clamps (Fig. 11) not between, a much more difficult procedure. As the vagina is opened, the cut edges of its wall are seized with tenaculum forceps and pulled upward and a small strip of gauze packed into opening from above downward to prevent peritoneal soiling from the vagina.

The uterus is removed with the vaginal wall clamped so that the cancerous cervix is shut off and peritoneal soiling is reduced to a minimum. The edges of the vaginal wall are whipstitched to control any bleeding (Fig. 12), and the opening covered with gauze.

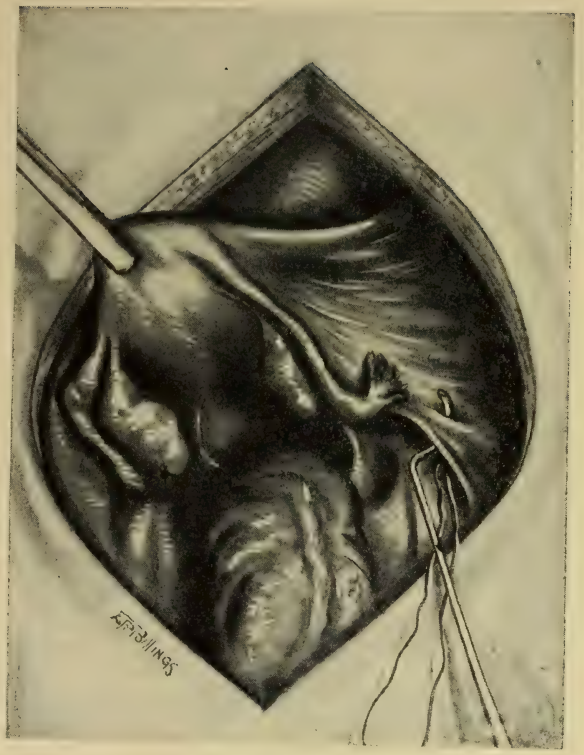

FIG. 1.—Extensive abdominal incision in median line from pubes to umbilicus. Uterus drawn sharply to left and ovarian artery tied with catgut well out toward the pelvic wall.

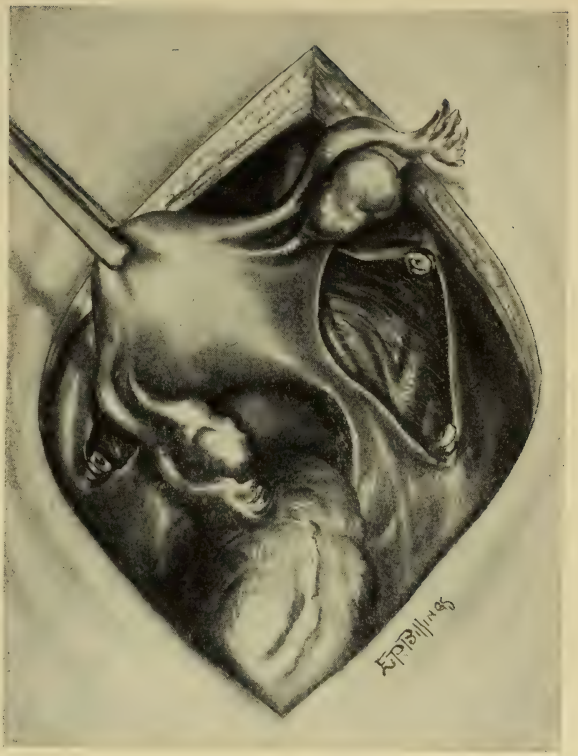

FIG. 2.—Ovarian artery and round ligament severed and cut. Opening made between layers of broad ligament so as to expose pelvic vessels and ureter.

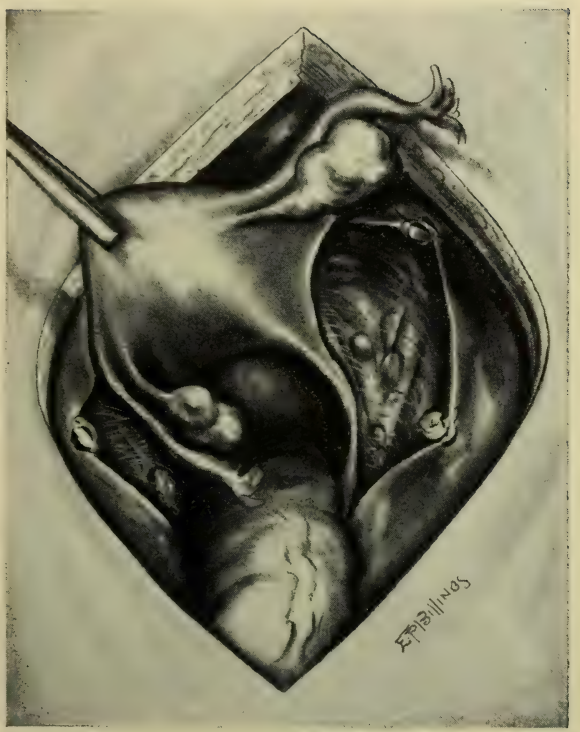

FIG. 3.—Peritoneum cut upward to give a better view of ureter and pelvic vessels.

FIG. 4.—Vesico-uterine fold of peritoneum cut across and bladder pushed well upward in median line. Laterally, vaginal wall should not be exposed until later for fear of venous bleeding.

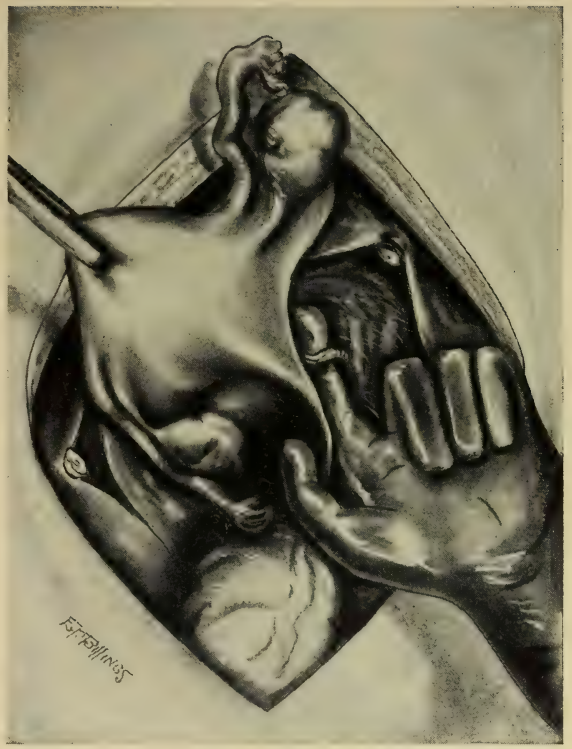

FIG. 5.—Locating the uterine artery by passing forefinger along ureter.

FIG. 6.—Uterine artery ligated in two places and severed, thus exposing ureter lying beneath.

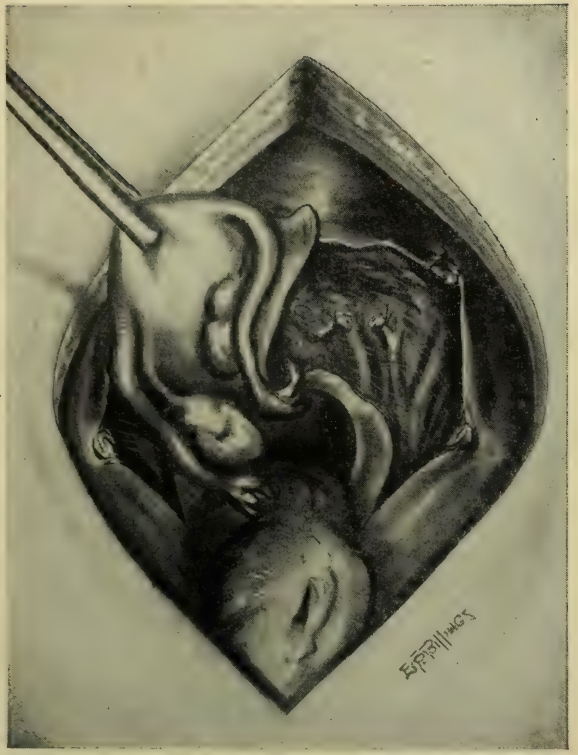

FIG. 7.—Showing vesical veins running across the lower portion of the ureter. These veins should be seized by hemostats at either side of the ureter before the ureteral sheath is completely divided; otherwise they will be injured and profuse bleeding will result.

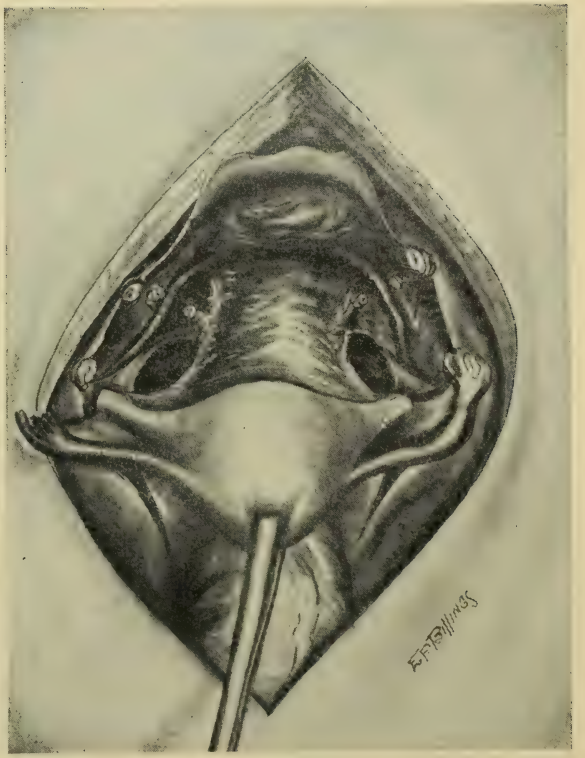

FIG. 8.—Showing the bladder pushed well upward. The ureter should be separated by gauze pressure and blunt dissection from the uterus from where it enters the parametrium up to its insertion into the bladder. The vaginal wall should be isolated to such an extent that at least one inch can be removed with the cervix.

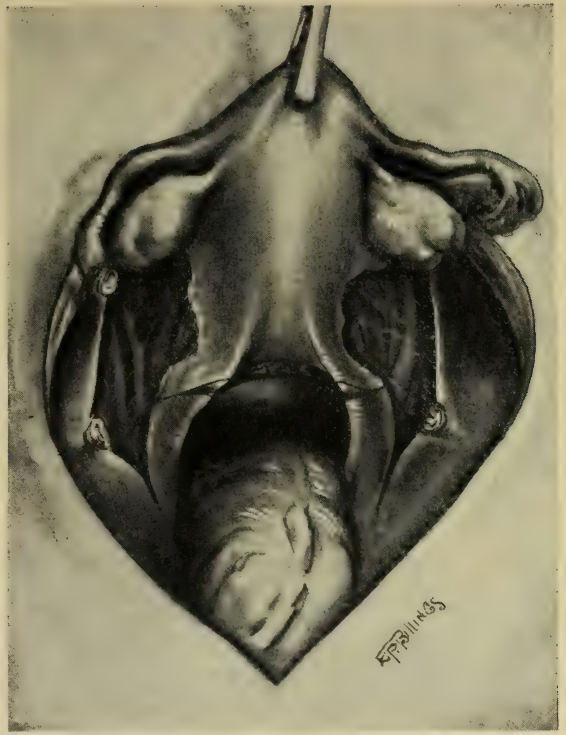

FIG. 9.—Showing where posterior fold of peritoneum should be severed. Ureter drawn to one side, rectum pushed downward. Sacro-uterine ligaments seized with hemostats; any bleeding controlled in same way.

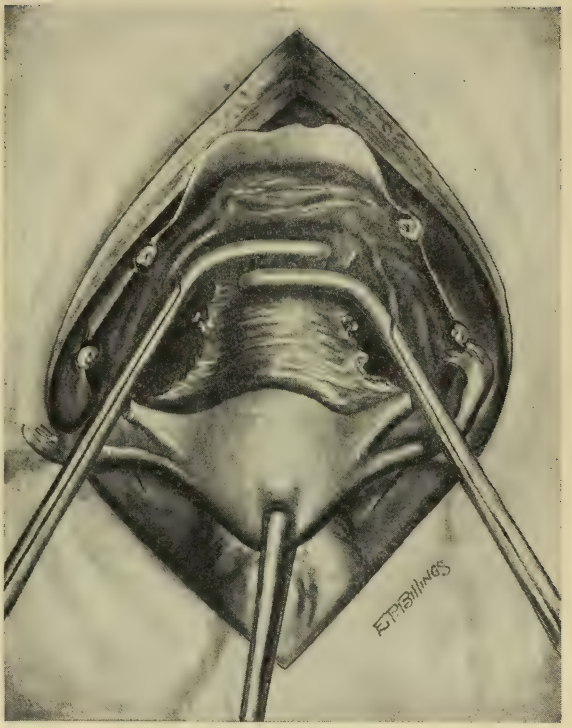

FIG. 10.—Pelvic tissues protected by gauze packs. Bladder drawn upward and ureters to one side. Clamps placed well down on vaginal wall at least one inch away from end of cervix.

FIG. 11.—Vaginal wall cut below clamps. Cut edges seized as wall is cut and pulled upward. Peritoneal soiling from vagina prevented by packing small piece of gauze into amputated vagina from above.

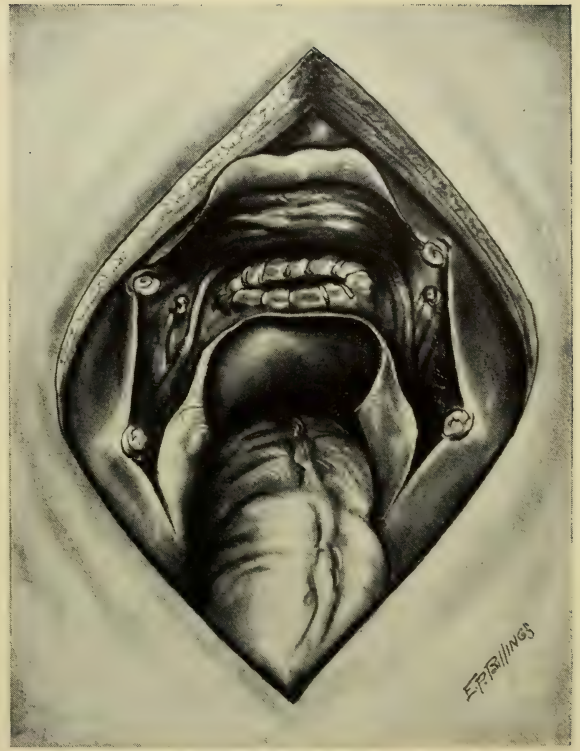

FIG. 12.—Vaginal walls whipstitched to control bleeding. Vaginal opening protected with gauze and glandular dissection proceeded with whenever the condition of the patient warrants prolongation of the operation.

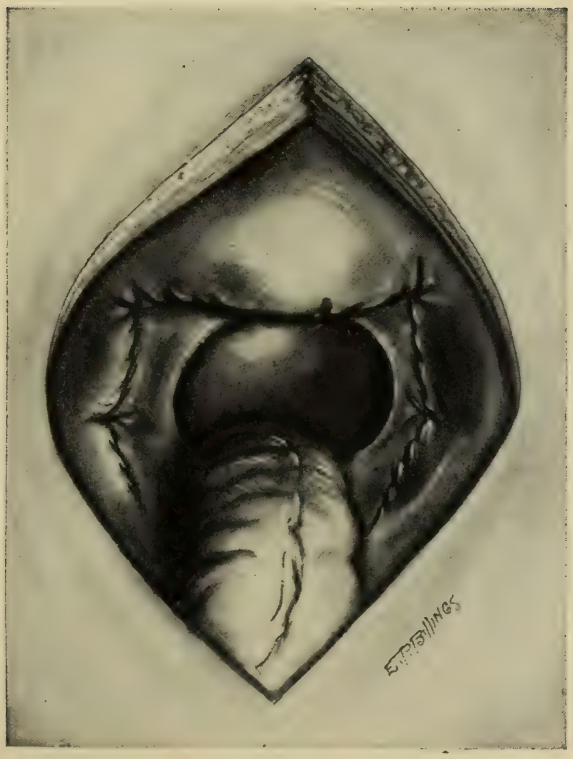

FIG. 13.—Peritoneum sutured in place and all raw surfaces covered. Spaces about iliac vessels drained by small pieces of gauze leading out through vagina.

If the condition of the patient warrants, the lymph glands should be carefully removed. This can be done by sight as well as touch. I believe this dissection should be as thorough as the condition of the patient warrants. Unquestionably Ries is right when he insists upon the importance of the removal of the pelvic lymphatics. It is a logical surgical procedure and therefore desirable. The operator, as his experience increases, should work more and more toward extensive glandular removal, for thereby he may be able to save a certain number of one-third of the patients where the glands contain metastases. But in his endeavor to save these patients he must not too greatly jeopardize the remaining two-thirds where the glands are not affected to any great extent, if at all. We must remember that, after all, more has been gained from a wide removal of the parametria. These regions are almost invariably affected and in operable cases wide excision is possible without too much danger.

The toilet of the peritoneum is now completed. All oozing is done away with either by extra catgut sutures or by gauze pressure. With a running catgut suture the peritoneal edges are brought together and the general peritoneal cavity shut off (Fig. 13). Small pieces of gauze leading from the iliac spaces through the vaginal opening will serve for drainage. Occasionally more gauze will be necessary on account of persistent oozing.

The abdominal wall should be closed in layers with retention sutures without drainage.

It is not the purpose of this paper to discuss the various complications which may arise during the course of the operation.

These are considered in the more detailed discussions of the technique.

Those desirous of knowing my personal results with the radical abdominal operation are referred to a paper recently published in *Surgery, Gynecology and Obstetrics*, where the figures are given in detail.

A MALIGNANT INTESTINAL GROWTH REQUIRING THE REMOVAL OF AN UNUSUAL NUMBER OF ABDOMINAL STRUCTURES

By Thomas S. Cullen, M. D.
Baltimore, Maryland.

My object in reporting this case to the society is to show what may be done in some cases in which the surgeon, on opening the abdomen, feels completely baffled, but in which, on carefully surveying the field, he finally detects the key to the situation, and can remove the growth that at first has seemed impossible of enucleation.

In this case my first impulse was to close the abdomen, but the family physician, Dr. Ira McCurdy, of Frederick, insisted that the patient had been suffering from excruciating abdominal pain, that there were already signs of partial obstruction, and that, judging from her condition for the past month, he felt sure she could not last over a few days without operation. Under these circumstances I made a further examination of the combined tumor, and found that the key to the situation consisted in first enucleating the uterus with the adnexa and turning them up on the tumor. The operation then became essentially an abdominal instead of an abdominopelvic one.

The after results certainly more than repaid us for the chances taken. The patient, after a short time, was completely relieved of her former pain, and in a few weeks was able to go about as usual. She had over a year of relatively good health before any further signs of the growth made themselves perceptible.

Mrs. M., aged fifty-six years, was seen in consultation with Dr. McCurdy, December 20, 1909. She was exceedingly thin, pale and emaciated. Before her illness, which dated back several months, she had weighed 120 pounds. At the time I saw her she weighed 85 pounds.

On pelvic examination I found what appeared to be a myomatous uterus, which was firmly plastered to the left side of the pelvis and which almost completely filled it. As the patient gave a history of having flattened stools, occasionally associated with diarrhea, we bore in mind the possibility of a malignant intestinal growth.

Operation. The patient was removed to the Johns Hopkins Hospital, where she was operated upon on December 28, 1909. On opening the abdomen we immediately found what appeared to be a mesenteric growth. Plastered over the surface were loops of small intestines and a considerable area of large bowel. The fundus of the uterus was firmly adherent to the tumor, and the appendix was also involved in the growth. Realizing the weak condition of the patient, and the extensive operation necessary to even attempt complete removal of the growth, I hestiated, but on being told by Dr. McCurdy that the patient could not live over a few days in her present condition, I accepted the responsibility and commenced the operation. After determining definitely that no secondary growths were visible, and finding that the original tumor was somewhat movable, and that it did not implicate the larger abdominal vessels, we started its removal. The key to the situation consisted in first freeing the uterus. I therefore did a supravaginal hysterectomy, taking away the uterus, tubes, and ovaries. No attempt was made, however, to separate the pelvic structures from the intestinal growth, but they were turned up on the surface of the tumor and the empty pelvis was then packed with gauze. The appendix was found intimately attached to the tumor mass. It was likewise cut off, covered with gauze to prevent infection, and turned up on the surface of the tumor;

the stump was then closed. We next encountered an adherent loop of small bowel near the cecum; to this a clamp was applied. The other end of the same loop, about 18 inches distant, was also clamped and the intervening bowel cut loose. The descending colon over an extent of several inches was intimately blended with the tumor. This area was freed. Finally, we were able, after using many catgut sutures, to tie off the mesentery which fastened the tumor to the vertebral column. The entire mass, consisting of the tumor, the descending colon, a large area of small bowel and several inches of large bowel, the uterus, tubes, ovaries, and appendix, was then removed in one piece. On carefully examining the small intestine we found that the blood supply for at least a foot and one-half had been injured; we therefore removed this area of bowel also.

The two ends of small bowel were closed and a lateral anastamosis made between the small bowel and the cecum, which was only an inch removed from the distal end of the small bowel. On the left side, where a considerable area of descending colon had been removed, the tissues were fortunately redundant. Here also we closed both ends and did a lateral anastamosis between the descending colon and the sigmoid. A drain was laid in the lower angle of the abdominal incision and another in the vagina.

The patient on her return to the ward showed a moderate degree of shock. After a week or two she had slight diarrhea, but otherwise manifested no untoward symptoms. At the end of five weeks she returned home in relatively good condition.

December 1, 1910. I heard from this patient a few days ago. She is in excellent health and is going everywhere. She has a good appetite and digestion.

March 20, 1911. The patient is rapidly losing weight, has a great deal of abdominal pain, and from the present indications will not survive over a month or six weeks.

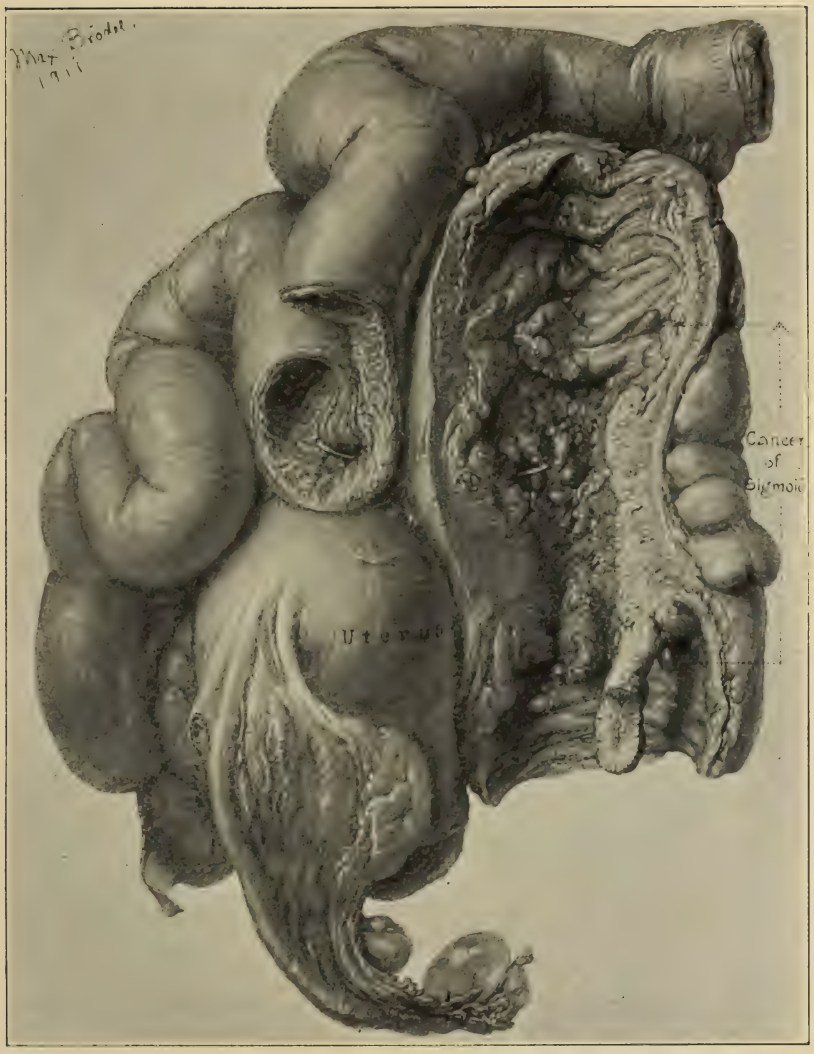

Fig. 1.—Removal of a carcimona of the sigmoid, several feet of small bowel, the uterus, tubes, and ovaries, and the appendix in one mass. The entire circumference of the sigmoid is involved by a carcinomatous growth. The advancing margin of the growth is sharply defined, and from the lower edge a long tongue-like polyp is growing. The cancer has eaten through the sigmoid and grafted itself upon the small bowel, and at one point had perforated the small bowel (as indicated by the bristle). Here there is a fistulous opening between the sigmoid and the lumen of the ileum.

Where the necrotic cancerous mass tended to break through into the general peritoneal cavity the uterus has adhered to it, thus eliminating the danger of peritonitis from this source. The normal tubes and ovaries are attached to the uterus. The appendix was involved in the process. It lies on the under surface of this mass. For the tumor on section, see Fig. 2.

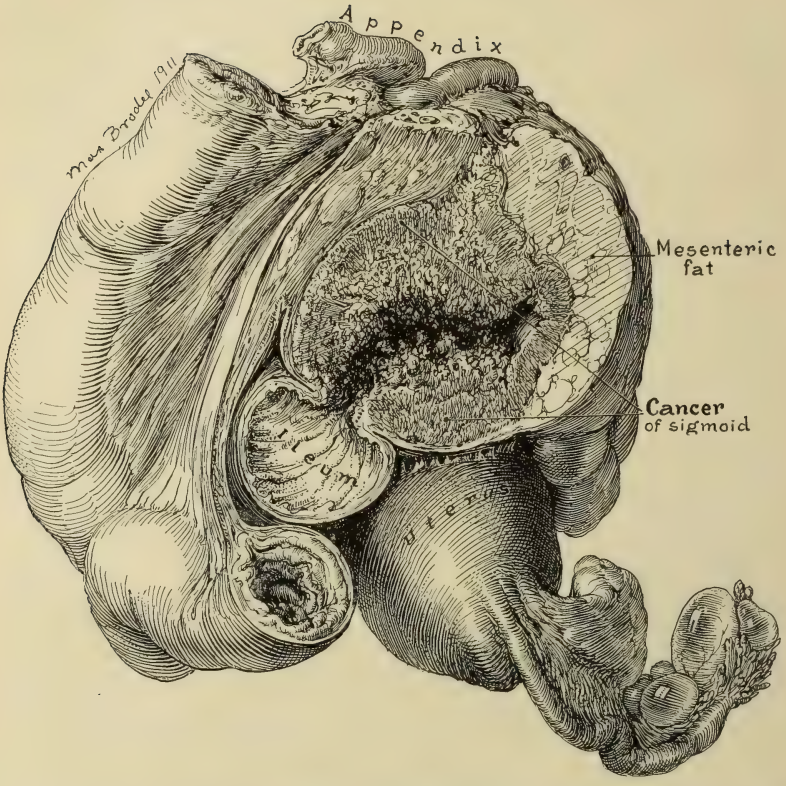

FIG. 2.—Carcinoma of the sigmoid breaking through into the ileum. This figure represents a transverse section through Fig. 1. The carcinoma occupies the entire circumference of the sigmoid at this level and has formed a fistulous opening into the ileum. The uterus has become intimately blended with the growth, reinforcing it at the point where it tended to rupture into the general peritoneal cavity. The adherent appendix is seen in the upper part of the specimen.

Description of the Tissues Removed.

Path. No. 14,543. Examination of the hardened specimen: The specimen (Fig. 1) is made up of 15 cm. of the descending colon, containing a malignant growth, of between two and three feet of small bowel, of the uterus with its appendages, and the appendix, all in one mass.

The descending colon is occupied by a newgrowth, 8 cm. in length. This involves the entire circumference of the bowel, the walls varying from 5 mm. to 1 cm. or more in thickness. The bowel, where thickened, is in places smooth, but at other points presents an eaten-out appearance. The advancing margin of the growth is sharply defined and raised about 1 or 2 mm. from the surface. On the inner or median aspect of the growth there is a perforation. The growth has extended directly through and has communicated with a loop of small bowel. It has likewise encroached on the mesentery of the small bowel, forming a tumor, globular in shape and about 7 cm. in diameter. This has extended to the peritoneal surface of the mesentery, but does not appear to have broken through the surface. At one point, however, it forms a subperitoneal nodule 1 cm. in diameter. At the point where the fistula has extended from the colon into the small bowel, the walls have evidently become exceedingly thin and the right cornu of the uterus has become plastered on to the mesentery at that point (Fig. 2), evidently acting as a cork and preventing the broken-down area from bursting into the peritoneal cavity. The cornu of the uterus is firmly attached to the mesentery over an area 5 cm. in diameter.

The uterus itself is a little enlarged. The tubes and ovaries are normal.

The middle portion of the appendix is glued to the mesentery. The tip of the appendix is free, but the surface is in places covered with adhesions.

Histological Examination. Sections from the growth in the descending colon shows that it is an adenocarcinoma, the glandular type being very evident. The glands themselves, which, as a rule, are large, are lined with several layers of epithelium, and many of the glands contain secondary ones developing within them. The superficial portions of the growth have undergone necrosis. There is fragmentation of nuclei and coagulation necrosis. The uterus is the seat of a commencing adenomyoma. The appendix shows marked involvement.

In this case we have primarily a malignant growth of the descending colon. This has involved by continuity a loop of small bowel and opened into it. It has also formed a large tumor which has encroached on the mesentery of the small bowel. The fundus of the uterus has glued itself on to this malignant growth where the walls tended to give way.

DISCUSSION ON THE PAPERS OF DRS. MacCARTY, COLEY, PARK, PETERSON, AND CULLEN.

Dr. Guy Le Roy Hunner, of Baltimore.—I wish to say a few words regarding Dr. Peterson's paper. As he has said, this is an old subject, and one that is familiar to all of us, and I think he is right in considering it such an important subject that it should be brought before a meeting of this kind, and we ought to have it brought before these meetings more frequently than we do. It is difficult, in looking at these beautiful photographs he has shown, to appreciate the difficulties of the operation.

Those of us who have been through the stages that he speaks of, getting the high primary mortality, and finally get where we think we can give a patient a fair show for her life, realize some of these difficulties. It may seem almost Utopian, but it has seemed to me for a long time as though we physicians and surgeons should have the welfare of our patients enough at heart, and should be generous enough, to refer these cases, no matter if we feel a certain amount of self-reliance, to more experienced men, not relying on an inferior operation for their cure, and unless we have done a number of these operations,

we are apt to meet the Waterloo that Dr. Peterson spoke of. I am in hopes that the day is coming when there will be a few men in different sections of the country, like Dr. Peterson, Dr. Cullen, Dr. Sampson, and Dr. Werder, of Pittsburg, who have persevered and developed an operation that will give these patients the best opportunity for their lives, and a fair opportunity for recovery if they can get these cases early. It seems to me, in a community like Nashville, where you have so many excellent surgeons, you must have a number of expert men who can do abdominal or pelvic surgery with a certain degree of confidence and perfection, and it would be an ideal thing regarding this immensely important and serious operation to have one man develop the technique to a greater degree of perfection than his colleagues, and then the other men should be generous enough to refer to him these cases. This seems rather Utopian, but it is such an intensely serious and important problem that I would like to see such a development.

Dr. R. M. Cunningham, of Birmingham.—I simply wish to submit a few remarks in reference to trauma as an etiological factor in cancer. We all know that a continued mild irritation may produce cancer, or that cancer may follow it, such as a lacerated cervix, for instance, or the pressure of glasses, according to Dr. Wyeth, for a long time on the nose, and so on, may be followed by cancer. Acute traumatism, as a determining factor or as a predisposing factor in cancer, is not in accord with my experience. I base this on 25,000 cases of traumatism which I have seen in the last twenty-five years, contusions and lacerations predominating. Contused, lacerated wounds and fractures and burns make up the major portion of my surgical work, and in not a single instance has cancer followed. It is true that a great many of these men were not kept under our observation, and it is also true that many of them have remained under observation, and I cannot let what has been said pass, with my experience, without challenging the doctrine that an acute traumatism will produce cancer. I venture the assertion that the doctor relates cases where most of them were within the cancer age, and if I understood the doctor rightly, 25 per cent. gave a history of traumatism.

Dr. Coley.—Nearly 50 per cent. in the breast, and 21 per cent. in the sarcomas.

Dr. Cunningham (resuming).—I expect most people who have lived to be forty-five or fifty years of age, have had some sort of injury, and I would be more inclined to attribute that to coincidence. It seems to me, in the case of hernial operations, if Dr. Park's doctrine be true, and the profession accepts it, that might have been infection. I know osteomyelitis occasionally occurs through blood infection. I have known

only one case where sarcoma followed a fracture, and that was in a little girl, aged twelve years. The fracture united; she fell upon the pavement, broke it, and the attending physician later amputated the limb. I saw her in consultation a short time before he did that. Now, I gave it as my opinion, in that case, that the child had sarcoma before the thigh was fractured. Of that, of course, I do not know. It followed rapidly, only a month or six weeks from the second fracture until the amputation was done, and a few days later death occurred.

This is an important subject not only in its scientific, but in its medicolegal, aspects, and I want to submit that, according to my observation and experience, which have been ample for the observance of these cases, I have known no case of cancer to follow, and only one of sarcoma.

Dr. J. Wesley Bovée, of Washington, D. C.—It perhaps would not be out of place if I should detail again to the members here, as I have through the press, the technique of the operation for cancer of the uterus that I have followed. I began this work a month after Werder's paper was published in February, 1908, in the *American Journal of Obstetrics*, and it was planned somewhat along the line Dr. Peterson described, but it varies in some points on which I wish to lay some stress. In the first place, after getting the field of operation well in view, that is, the intestines packed back, etc., I ligate the ovarian vessels; next, I ligate the internal iliac vessels or their anterior branches. I then make a little slit in the peritoneum, throw a suture around the ureter, bring it out through the opening without tying, bring the two ends out of the abdominal opening together, and put a clamp on it. Next, I go over and cut off the round ligaments where they go through the internal ring; then it is a matter of dissecting from the round ligament attachment where I cut it off back to where I cut off the ovarian vessels, and then going on up to the division of the iliacs and dissecting out the glands. Now, I make the dissection across. Ligating the internal iliacs does away with the necessity for ligating the uterine arteries, and gives you a practically bloodless field of operation. I cut across from one side to the other, separate the bladder forward, and go back and connect the dissections between the two exposures of iliacs where I dissected up the glands, cutting off the uterosacral ligaments as close to the pelvis as I can and dissecting them forward. As the dissection continues onward and downward along the vagina, as far as I can go, cutting off the uterosacrals, I can then pull the uterus and appendages up through the abdominal wound and easily dissect the vagina out practically to the vulva from above. After this dissection is completed I push the specimen out

through the vulva from above. One thing I object to in Dr. Peterson's pictures is the vulsellum fastened into the body of the uterus. I am particular not to put anything like that on the uterus. A little piece of gauze is sutured to one or the other appendage (one stitch to pull it down), and I push down with the uterus and appendages as far as it will go. I bring the peritoneal surfaces together over the gauze, close the abdominal wound, put the patient in the lithotomy position, sever the vagina at the junction of the dissected and still adherent portions of it, take away the specimen, pull the gauze down a little bit, and, cutting off the sutures I have tied close to the uterus, the operation is finished. The peritoneum is closed completely. I have not exposed the peritoneal cavity to any discharge from the uterus. The field has thus all been left extraperitoneal. This operation I have done since 1898 with modifications, and it can be done quite rapidly. I could not give you the number of minutes it takes to perform the operation, but ligating the internal iliacs does hasten the procedure. It is an operation that was advised by Pryor to starve the cancerous tissue in operable cases. There is one drawback, namely, there may be sloughing at the base of the bladder, so that you will get a vesical fistula from lack of blood supply, but that does not occur very often.

Dr. William C. MacCarty, of Rochester.—In regard to the etiological relation of trauma to sarcoma, I recently began an investigation of our cases of sarcoma, and I wish to confirm what Dr. Coley has said in regard to the record of acute or chronic inflammation in the histories of cases of sarcoma. I cannot give you the exact figures, but in going over the histories of the cases, it is exceedingly striking.

In regard to what Dr. Cunningham said about chronic inflammatory conditions producing malignant changes, it is exceedingly difficult to differentiate between acute and chronic inflammation, and often a few days may mean chronic inflammation. We must speak of it merely as an inflammation.

Dr. Thomas S. Cullen, of Baltimore.—I want to say a word or two with reference to the term "basement membrane," referred to by Dr. MacCarty in his splendid paper. This term has been in use for years, but we really do not know what it means. In our study of cancer we pay little or no attention to the so-called basement membrane. The uterine mucosa offers a much simpler field for study of cancer than does the breast. The mucosa lining of the body of the uterus consists essentially of uterine glands and of stroma, and any little deviation from normal is readily followed. We base our diagnosis of cancer on the general pattern of the growth or on the

individual cell changes, and in suitable cases on both these phenomena.

I was glad that Dr. Peterson drew attention to the extreme care which is necessary in doing hysterectomy for carcinoma of the uterus. That is one of the cardinal principles. These patients should be built up as thoroughly as possible, and, where we find it necessary, we should curette away the redundant portions of the growth. Where curettage is necessary, I think it is wiser to curette and then wait a week or two, than to curette and operate at once. The giving of two anesthetics in one week seems to me undesirable. It was only three weeks ago that I drew the attention of my class to the great danger of these patients dying on the table or immediately afterward. They had a graphic demonstration of that fact within the course of the next two hours. The patient in question did splendidly for an hour and three-quarters, but collapsed just as we were completing the operation, dying in the course of an hour. The cancer was far advanced and the patient's general condition was not good. She apparently died of shock, which could in no way be accounted for by the small amount of blood she lost.

We use the Trendelenburg position until the field is exposed and well packed off. The table is now dropped as far as is consistent with a good view of the operation field. In these cases the patient has absorbed septic products from the cancerous growth, and in addition the heart muscle is in a weakened condition due to the lack of a good blood supply. This is the result of the frequent or continuous uterine hemorrhages.

Dr. George H. Noble, of Atlanta.—I had hoped to hear more on the pathological side of the question, for I have had considerable experience and am perfectly familiar with the operation. There are one or two points, however, that I would like to emphasize relative to the latter.

(1) In advanced carcinoma of the cervix uteri there is considerable danger of sloughing of the ureters when close dissection of them is required, and liability to recurrence of the disease if it is not done. (2) A fair percentage of local recurrences are due to the fact that we too often neglect resection of the bladder and fail to remove enough of the vagina.

To do these things thoroughly, especially if we go to the extent of resecting the ureters, makes the operation one of great magnitude, and as the tendency to recurrence of the disease is great, the ultimate results are discouraging. But when we do meet with exceptionally good results we regret the tendency to neglect this class of cases.

Sloughing of the base of the bladder, referred to by Dr. Bovée, is perhaps more frequently due to trauma in separating the bladder from the uterus. Large pieces of the muscular walls of

the bladder are torn away in dissection, depriving the mucosa of its blood supply. In such circumstances necrosis of the mucous membrane and urinary leakage is a natural result. Infolding of the mucosa and suturing the thicker bladder walls over it does not prevent the accident. More recently I have been securing better results by cutting away the mucosa in cases of this kind or resecting the bladder walls without attempting to dissect it from the uterus.

Dr. MacCarty (closing).—I want to thank the President and members of this Association for allowing me the privilege and pleasure of attending this meeting and of participating in your discussions. It has certainly been a great pleasure to me, especially since all my work in pathology is in association with surgery and has a direct bearing upon surgical diagnosis and treatment.

Dr. Coley (closing the discussion on his part).—Just a moment to answer the remarks made by Dr. Cunningham. If the three cases which I presented, in which a medical examination was made directly before the injury, and showed normal structures, and within two or three weeks after a sarcoma developed, do not answer the point made by Dr. Cunningham, then there is no use in arguing the question further or in presenting other cases.

I will present one other photograph of a boy's femur. It is a case of acute traumatic malignancy in a school-boy, aged ten years, who, in going home from school, was kicked above the knee by another boy. The mother examined the knee and found nothing. She examined the knee the next day and found nothing, but one week later a tumor developed right above the knee, and in three weeks from the time the boy was kicked he came to the New York Hospital for Ruptured and Crippled with a tumor extending around the entire femur, measuring two inches more than the other side. Ten days later I amputated below the trochanter, and here is a photograph of the bone showing a periosteal sarcoma. This tumor developed in a perfectly sound boy, three weeks from a kick, and whether the kick had anything to do with it, I do not know, but I believe it had.

Here is another photograph of a case of fracture of the femur in a man who was kicked by a horse, the horse's hoof striking him above the knee, fracturing the femur at the point I show you. The fracture healed promptly, but a few weeks later there was a great enlargement, and examination showed it to be a sarcoma. Amputation was performed at the hip-joint, and the patient died a year later of lung metastases.

Dr. Cunningham said that he has never seen a case of malignant tumor develop after injury. I have the histories of 306

such cases, personally observed, which I should like to give you in detail, but the time is too short.

Dr. Park (closing the discussion on his part).—The relation of trauma to cancer cannot be considered by itself. All of us receive injuries at one time or another. There is not a human being who attains any age but what has received an injury at some time, and we do not all have cancer. There must be some other factor introduced than injury. There is a favorable condition of soil developed, and there is some sort of extrinsic condition which is introduced, or which comes into play in consequence of the combined action of the result of the injury and infection, if you call it such.

I wanted to speak of the matter of cancer therapy and radium therapy, and so on, but there is not time for that.

I wish simply to call attention to one other thing recently brought out in our investigation at the Buffalo Laboratory, where they have been doing great work with sarcoma and goitre in fish. Through the government, the various fish interests of the country were placed at our disposal. Dr. Gaylord, who has worked out the matter carefully, found there are certain pools in certain sections of the country where the fish all develop goitre, and some of them of the cancerous type, and while this was true of certain pools, other pools seemed almost immune. He took puppies born in New York State and of good hereditary stock, and imported them into Maine. Those puppies were given nothing to drink but water from the infected pools, Every one developed sarcoma of the thyroid. This is an experience which seems to us to give the disease a certain infectious character, and cannot be disregarded.

Dr. Peterson (closing the discussion on his part).—It is impossible in ten or fifteen minutes to cover the subject of the radical operation for carcinoma of the uterus, so I did not go into the complications. We get ureteral complications. We get sloughing of the bladder, and that is one of the objections, by the way, to Dr. Bovée's proposed technique of tying the internal iliacs. When you strip the bladder back it sloughs. It sloughs in a certain proportion of cases anyway, but the chances of it sloughing would be greater if the internal iliacs were to be tied.

Dr. Cullen (closing).—Dr. Park intimated that the time of reckoning would come in some of these cancer cases on which we have operated. The time of reckoning will undoubtedly come in the case I reported, sooner or later, but from being an invalid and unable to do anything, the patient has been, for the time being, converted into one of relatively good health, so that now she is able to go anywhere, to eat anything she wants to and at the end of a year since operation was performed she seems well.

VOLVULUS OF THE CECUM

By H. J. Whitacre, B.S., M.D.
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Volvulus of the cecum is a lesion which has not been reported with great frequency, and four cases coming under the personal observation of the writer are considered worthy of record. Treves states that twists of the cecum and ascending colon are among the least frequent varieties of intestina obstruction.

The cecum is completely covered by peritoneum, and has no mesentery, since the mesentery of the ileum passes directly to the colon. There may be no mesocolon in any portion of the ascending colon, but in 26 to 30 per cent. a mesocolon is present in its lower part (lower one or two inches). In all instances the ascending colon becomes steadily less movable from commencem nt to termination, and even in those cases where a mesocolon is present below, the upper part is uncovered by peritoneum and adherent to the posterior structure by areolar tissue. Occasionally, and according to Curschmann's observations (*Deutsch. Arch. f. klin. Med.*, Band li), frequently this mesocolon and the adjacent mesentery of the small intestine is abnormally long, and a very wide range of mobility is given to the cecum. Such variation from the normal gives the predisposing cause of volvulus of the cecum. The greatest variation in the range of mobility in the cecum has been observed, I am certain, by all operators in appendicitis. I have many times

drawn an appendix into a gall-bladder incision and removed it. I have likewise made special observation of this point in a great many appendix patients who have been referred to me because of an annoying more or less continuous pain or discomfort and sensitiveness in the region of the right iliac fossa which has persisted in spite of all medication. I have seen so great a mobility in many of these patients at the time of operation that I have felt certain that this abnormality has had much to do with the symptoms. Fixation of a cecum of this sort has resulted in the complete relief of symptoms, and I feel fairly convinced that certain other cases in which the appendix alone was removed continued to have some discomfort after operation because this very definite lesion had not been corrected. Corner and Sargent (*Anna's of Surgery*, 1905, vol. xli, pp. 65 to 75) have called special attention to this point. Volvulus of the cecum, as has been stated above, does not occur with very great frequency, yet in view of my own experience I can scarcely avoid the conclusion that it probably occurs much more frequently than we think or know. This statement I would make because I believe that a fair percentage of those cases of intestinal obstruction that right themselves without operation must be of this type. Volvulus of the sigmoid by reason of its anatomic mechanics, it seems to me, would be less likely to be corrected by non-surgical treatment than would volvulus of the cecum. The sigmoid volvulus cases that I have operated upon never could have become spontaneously untwisted or in any way aided by enemata or posture. A conclusion to the effect that a certain number of cases of spontaneously relieved intestinal obstruction must be volvulus of the cecum is of course largely theoretical, but I believe that my Cases I and IV would serve as evidence in favor of such a conclusion.

There is another group of cases in my experience that might be included under the general head of volvulus, and a certain number in this group must have been volvulus of

the cecum. I have encountered a fairly large number of cases of intestinal obstruction in extremis where no operation was permissible except a rapid enterostomy often under cocain anesthesia. Many of these cases were operated upon a second time within one week or ten days for thorough investigation as to the cause of the obstruction and for the closure of the enterostomy opening, but no mechanical cause for the obstruction symptoms could be found.

A study of the reported cases of volvulus of the cecum seems to show that the lesion occurs three times more frequently in males than in females. As to age, volvulus of the cecum has occurred in every decade up to eighty years. The youngest patient was aged nineteen days. The symptomotology does not seem to differ materially from that of intestinal obstruction from other internal causes. Some authors speak of a false remission of symptoms following a tempestuous onset as characteristic. One author speaks of a first phase of cecal colic of unusual severity, a second phase of remission of pains after two or three days, and a third phase of complete obstruction.

Corner and Sargent have studied 57 reported cases; 19 of the cases operated upon recovered, while the other 38, 21 of whom were operated upon, died. The total mortality was 66 per cent., and the operative mortality 52.2 per cent.

The left hypochondrium has been by far the most frequent situation occupied by the cecum, while the left lumbar, epigastric, and pelvic regions, are next in order.

The majority of cases have been observed in Finland, England, and Germany.

Case I.—J. L. I., male, aged forty-three years, farmer, married, was admitted to the Good Samaritan Hospital May 1, 1910. The family and personal history present no points of special interest. Two years ago, while in perfect health, he suffered a sudden severe pain in the abdomen, and continued for one week with type symptoms of ileus low down in the intestinal tract. At the end of this period

I was called, and a few hours before my arrival there was a very large movement of the bowels. His symptoms were so much relieved that no operation was done, and he made a complete recovery. Since this time the patient has suffered much from gas distention and pain, and states that a knot frequently formed in the right side. These symptoms were relieved by cathartics. About one year ago he had a severe attack of pain, vomiting, and distention, which lasted three days, but was relieved by active catharsis. Seven months ago he had an entirely similar attack, again associated with right side distention, pain, and vomiting, which was again relieved by cathartics, enemata, tight bandaging, massage, and a knee-chest posture, which he had learned to assume. Seven days before admission for operation the patient was again seized with intense pain in the abdomen and severe symptoms of obstruction, which continued until the time of operation. Remarkable to note, this patient travelled a distance of fifty miles in a day coach, from the station to hospital in a street car, and presented on admission a temperature of 98°, a pulse of 88. Physical examination showed a facial expression of extremis, while the much distended abdomen presented an appearance of hills and hollows caused by the non-motile coils of distended gut.

Operation.—A twelve-inch incision was made through the right rectus muscle. Greatly distended colon occupied the entire field, but the small intestine was also distended to varying degrees in different parts. The tremendously distended cecum was followed upward, and the ascending colon found to dive down into deeper parts, and could not be traced. Finally the collapsed transverse colon and the omentum were found in the splenic region and traced over to the hepatic region where it was lost. The duodenum was traced to the same region in an entirely abnormal course. An extensive twist was suspected, and evisceration demonstrated that one complete twist of the entire mass of eviscerated gut in a direction opposite to that taken by the hands of a clock

corrected the abnormality and restored the anatomic relationship of the large and small intestine. It was now an easy matter to see that a very freely movable cecum and ascending colon had travelled across the front of the mass of small intestine, a twist of the entire mass had then occurred, and the cecum had travelled behind the mesentery and reappeared on the right side of the abdomen. The obstruction was caused by the twist in the upper part of the ascending colon and by the pressure of the mesentery at the point where it passed underneath. There was no necrosis of gut. This patient made an uninterrupted recovery, and has remained well up to the present time. This volvulus involved the entire mass of the small intestine, cecum, and ascending colon, yet the twist was made possible and definitely caused by an abnormal length of the ascending colon and adjacent mesentery. The ascending colon, cecum, and lower few inches of the ileum were furthermore the only structures involved in the mechanical and nutritional obstruction, and for these reasons it had seemed justifiable to classify the case as a volvulus of the cecum and ascending colon.

I wish to call attention to the fact that this patient suffered from three previous attacks of obstruction, all of which were spontaneously relieved by enemata, massage, and posture. It would seem fair to assume that these attacks were due to a volvulus of the cecum and ascending colon: A twist of the extent found at operation could not have been relieved spontaneously.

Hutchinson (*Clinical Journal*, London, June 5, 1907) reports a case of this variety, and states that this is the second case on record.

Case II.—E. S., male, aged twenty-five years, single, pattern maker. Referred by Dr. J. C. Buttemiller. Family and personal history present no points of special interest. Nine months ago patient suffered from acute diffuse pain in the abdomen, which was not associated with vomiting. He took active carthartics, was not confined to bed, but had

continuous abdominal pain for twelve days. No further trouble was experienced until eight weeks ago, when he again suffered very sudden acute abdominal pain located in the right iliac fossa. At this time there was vomiting and some elevation of temperature. He was correctly treated in a non-operative way for acute appendicitis at this time. The patient states that he had a definite tumor at McBurney's point. He was disabled for eight weeks at this time, and has suffered continuously from symptoms of indigestion since this time. The abdomen has been frequently distended with gas, and the bowels almost constantly constipated. Three days before admission to the hospital, the patient suffered from indefinite pain in the chest over the sternum, and twenty-four hours before admission was seized with sudden pain in the right side of the abdomen, and vomiting. The abdomen became rapidly distended, there was a generalized sensitiveness, particularly below the umbilicus, but no temperature. The patient was first seen sixteen hours after the onset. During the following nine hours the condition of the patient became rapidly grave. The pulse became rapid, the distention increased rapidly, the vomiting continued, and the temperature was not over 99.4°. A differential diagnosis as between appendicitis and ileus could not be made, but operation seemed imperative. When the abdomen was opened a clear, yellow fluid escaped, and the small intestine was found to be greatly distended and dark in color, but the anatomy of the region was very obscure. After several bands of adhesion had been broken with the finger the cecum was found to untwist by a 90 degrees turn to the left, and the ascending colon immediately filled with gas. There now appeared an oblique line of necrosis, one-half inch broad, in the ascending colon, just above the cecum, which represented the line of twist. The friable small intestine was torn in the separation of adhesions, and a large amount of gas and fluid stool were drained off through the opening. An enterostomy tube was tied into this lacera-

tion, the line of necrosis in the colon was sutured over with silk, and the abdomen closed. The appendix was not removed. The condition of the patient was extremely bad at the close of the operation. He made an entirely satisfactory recovery, and is still in good health four years after operation. This patient suffered from ileus due to a demonstrated volvulus of the cecum. It would be difficult to decide as to whether the former attacks suffered by this patient were volvulus, with a complicating appendicitis, or whether they were primarily appendicitis with adhesions which aided in producing a volvulus in a freely movable cecum. Curschmann (*Deutsch. Arch. f. klin. Med.*, Band liii, 1894) speaks of cases of volvulus of the cecum which were associated with a suppurative appendicitis.

Case III.—H. P., male, aged forty-four years, mechanic, was admitted to the Germam Deaconess Hospital, February 21, 1908. This patient was seen for the first time, by Dr. J. C. Buttemiller, five days after the onset of his acute symptoms. He gave a history of sudden acute abdominal pain, and an inability to obtain a movement of the bowels. He had not vomited much until the fourth day, and his previous physician stated that he had had no fever. On the fifth day he presented a type picture of a patient in extremis from acute intestinal obstruction, with a pulse ranging from 140 to 160. He was immediately sent to the hospital.

Operation.—A right rectus incision was made because the distention was decidedly most marked in this side. This segment of the abdomen was entirely filled by the tremendously dilated, bluish-black cecum and ascending colon. These were deflated, and it was then found that the cecum and first part of the ascending colon had made a complete turn from right to left upon an abnormally long mesentery. The lower part of the ileum was wound tightly around the neck of the strangulated large intestine. The gut looked bad and the patient's condition was so grave that an enteros-

tomy tube was inserted and the patient put to bed. He died the following day.

Case IV.—Miss K., female, aged twenty-five years, presented a condition which might be called an incipient intestinal obstruction from volvulus of the cecum. She gave a history of one previous attack of trouble in the region of the appendix which had been diagnosticated as appendicitis. The attack for which I operated had likewise been diagnosticated as appendicitis, but was peculiar in the fact that there was no fever. She had suffered from acute localized pain and sensitiveness, and had vomited several times. At the time of operation, which was done very shortly after the onset of her trouble, the cecum was found to be distended and rather low down in the pelvis. In pulling it upward the cecum made a distinct, almost snapping half turn to the left, and the anatomy of the region was entirely apparent. The appendix was not much inflamed, but was removed. This patient made an uninterrupted recovery. It would seem to me that the beginning volvulus in this patient might have been relieved by enemata and posture.

There are a few points in connection with the above reported cases which may add somewhat to the symptomatology of the condition. First, it will be noted that the first symptoms were localized in the region of the cecum in all, and that the symptoms were so persistently right-sided that a right rectus incision was used in each case. Second, it will be observed that in Case I unmistakable attacks of obstruction, with symptoms very similar to the one calling for operation, had preceded. In Cases II and IV attacks which might very well have been due to volvulus had preceded the operative attack. A third point which may very safely be made, in conclusion, is this. This series of cases will serve to call attention to a subject which is not to be found in text-books dealing with intestinal obstruction.

DISCUSSION

Dr. Stephen H. Watts, of Charlottesville.—I have been very much interested in this paper of Dr. Whitacre's, for in the last two or three years I have had two cases of volvulus of the cecum. I recently came across an article on the subject in the *Revue de Chirurgie*, which suggested to me that I report these cases some time. In the two cases I refer to, the volvulus did not seem to be due to an actual twist of the intestine about the axis of its mesentery, but it seemed that the obstruction was due to the cecum being rotated to the left, about its own axis. In this connection I would say that if cathartics had not been used in these cases, and resort had been had solely to enemata from the beginning, the symptoms might have cleared up without operation. I think we are now beginning to use cathartics less in all kinds of abdominal conditions, and it is particularly in cases of intestinal obstruction that we should refrain from the use of cathartics. We all know that if we blow up a long balloon tightly, and then bend it, we produce an absolute kink in the balloon; whereas, if we blow it up only to a slight extent, we will not produce an absolute obstruction by bending; therefore, if we pile cathartics into the patient, we will increase the distention of the gut above the seat of obstruction, and therefore render an obstruction which has been partial absolutely complete. If we do not give cathartics, but resort to enemata, we may allow the gas or fecal matter to leak by, and the obstruction will probably clear up. I remember the time when we were in the habit of giving cathartics, sometimes washing out the patient's stomach on the table, and giving two or three ounces of castor oil or salts, through the tube, in cases of appendicitis, with local or spreading peritonitis, and postoperative intestinal obstruction was not infrequent. Now, we have very few cases of postoperative intestinal obstruction. If a patient has symptoms of slight obstruction, I do not give cathartics, and in the vast majority of cases a beginning obstruction will be relieved by enemata.

Dr. James E. Thompson, of Galveston.—I should like to ask Dr. Whitacre whether, in his cases, it was possible, during the operations, to determine the point as to whether the cecum had actually descended into the right iliac fossa, or whether there was a more or less embryonic condition. Originally the cecum is in the left hypochondrium, and during its descent it passes to the right, and then down. If the cecum had failed in its descent, a volvulus would be more likely to occur than under ordinary anatomical conditions.

Dr. Whitacre (closing).—I appreciate fully the remarks that have been made by Dr. Watts. I thoroughly agree with him that some of these cases were unkinked by the use of the enemata, and while it is impossible to prove this, and the conclusions must be largely conjectural, this patient was relieved in the earlier attacks by such enemata and by posture.

As to the kink referred to by Dr. Watts, it occurs in the same type of cases in which there are chronic symptoms, with movable cecum, and I am certain that this lesion is more frequent than we have been formerly led to believe. I have had a number of cases in which I am certain that the symptoms of discomfort and pain from which the patients suffered were due to a kink in the bowel, which had been caused by an abnormally movable cecum. We know that sometimes the cecum can be brought into the gall-bladder wound, it being found between the umbilicus or in the left side. In my case there was a distinct rotation of the mesentery. The mesentery was long—in fact, the mesentery of the lower part of the ileum and colon was so long that it made a complete twist, and I was able to definitely demonstrate the condition.

As regards the embryological causation, a point referred to by Dr. Thompson, I am sure that in a considerable percentage of these cases there is volvulus due to an embryological defect. In my cases the defect was not due to embryological failure to descend, but it was more an embryological defect of an abnormally long mesentery which failed to glue to the posterior abdominal wall as it should have done. I have operated on three cases of appendicitis in which the cecum failed to descend, and the appendix was found in the region of the liver, but not in these volvulus cases.

TWO CASES OF INTUSSUSCEPTION IN THE ADULT: ONE DUE TO MULTIPLE ADENOMATA OF THE INTESTINE, THE OTHER TO A SARCOMA OF THE CECUM

WITH A DISCUSSION OF ADENOMATA OF THE INTESTINE

By Stephen H. Watts, M.D.
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Intussusception is the most frequent variety of ileus, and according to Leichtenstern forms 30 per cent. of all cases of ileus. Although it is far more frequent in children, it is not altogether rare in adults.

As regards etiology, we must distinguish between the invaginations in small children and those in older children and adults. In the former the cause is usually to be sought in peculiarities of development and function of the intestine, which are generally not of a pathological nature, while in the adult, as a rule, we find some gross lesion of the intestine to be the underlying cause of the invagination. Of these lesions the most frequent and best known are tumors of the intestinal wall, and it is not often the malignant tumors that give rise to the intussusception, though they may be at fault, but the benign tumors, cysts, adenoma, angioma, myoma, lipoma, and fibroma, especially when they are pedunculated. Among other causes of intussusception are ulcerations of the intestine, inverted appendices, and Meckel's diverticulum.

In this connection it might be of interest to examine somewhat more closely into the etiology and mechanism of intus-

susception, as some further light has been shed upon the subject in recent years by the publications of Lorenz, and Delore and Leriche.

According to Nothnagel, invagination is due to an abnormally active tetanic contraction of a circumscribed portion of the bowel, that part of the bowel below the constricted portion being drawn up over it, apparently by the action of the longitudinal muscle fibers, the intussusception growing at the expense of the ensheathing bowel. In order that an invagination may take place it is necessary that one portion of the bowel involved in the intussusception possess at least a certain degree of mobility. This is always present in the small intestine, but in order for the large intestine to become invaginated it is necessary for its embryological mobility to have persisted abnormally or for it to have acquired a loose mesocolon secondarily by traction.

Whereas various explanations, such as the disproportion in size of the ileum and colon, the fixed condition of the colon and the mobility of the ileum, a tenesmus-like spasm of the ileocecal valve, etc., have been advanced to explain the great frequency of intussusceptions in the ileocecal region, Lorenz, and Delore and Leriche believe that the abnormal mobility of the colon, mentioned above, is the chief cause of these invaginations. The fact that perhaps 68 per cent. of cases of intussusception occur in children under one year of age is easily explained by this congenital hypothesis: It is only in the latter part of intra-uterine life that the ileocecal region (the usual site of intussusception) begins to be fixed; this fixation takes place slowly, and at birth is not always completed. Forty-eight per cent. of fetuses at term have a mobile cecum, and consequently in the first days of life the cecum can be invaginated more or less extensively. Gradually, however, the fixation advances, and in 85 per cent. of adults the first part of the large intestine is firmly fixed in the right iliac fossa, while in 15 per cent. it enjoys a certain degree of mobility, due either to a congenital abnormality

or to a long mesocolon which has resulted from traction. When we remember that in some cases of invagination the ileocecal valve may reach the rectum, we must realize the great mobility of the cecum and colon in these cases.

While the various forms of intussusception, ileocecal, enteric, colic, ileocolic, and iliaco-ileocolic, are generally described as occurring in the order named, Lorenz, and Delore and Leriche find that in many cases of so-called ileocecal invagination the apex of the intussusceptum is formed not by the ileocecal valve, but by the head of the cecum and the appendix, and are really cases of cecocolic intussusception. Lorenz thinks the appendix plastered to the head of the cecum may act as a tumor and be of some moment in the production of such intussusceptions.

There is also some discussion as to the manner in which pedunculated tumors give rise to invagination. Some say the invagination is produced by the mere weight and pull of the tumor on the intestinal wall, as it is carried forward by peristalsis and the stream of fecal material; others believe that the presence of the tumor excites a violent peristalsis, which results in the formation of an invagination, and state that if the former view were true the tumor would always occupy the apex of the intussusceptum, and this is not always the case.

It has been my fortune to meet with two cases of intussusception which were due to tumors in the intestine. These I will describe in some detail:

Case I.—*Intussusception Due to Multiple Polypoid Adenomata of the Intestinal Tract.* S. P., aged twenty-four years, Russian, was admitted to the Johns Hopkins Hospital, August 7, 1906, complaining of abdominal pain.

Family History. Unimportant. No history of similar trouble in his family.

Personal History. When five years of age he had prolapsus of the rectum. With each defecation the bowel would prolapse for an inch or two, but was usually easily re-

duced. Occasionally there would be some bleeding. This condition lasted for some years and disappeared spontaneously.

Present Illness. For the last three years the patient has noticed occasional cramp-like pains in the abdomen, which usually lasted only a few minutes. These pains were diffuse, not well localized, and did not incapacitate him for work. Occasionally he would vomit. Six months before admission the cramps became more frequent, sometimes lasted for one-half to one hour, and were usually located in the region of the umbilicus. The pains apparently bore no relation to taking food or to defecation. He vomited every few days, though his bowels remained regular. He states that he was unable to work for three months, then worked for a while in a desultory way. Four days before admission, soon after luncheon, the patient had a normal movement of the bowels, followed in a few minutes by a dull, nauseating pain in the region of the navel, and he vomited once, vomitus consisting of food he had eaten shortly before. Bowels moved twice the next day. Consistency of stools normal. No further vomiting, but a continuous dull pain in the region of the navel for two days before admission. Patient was unable to sleep on account of the pain and nausea. On further questioning, he states that three years ago he had a similar attack with intense pain, diarrhea, and bloody stools, which lasted a month.

Examination. Patient is a pale, rather poorly nourished man. Pulse, 96 to the minute; temperature, 100°; leukocytes, 15,600. Examination of lungs, heart, and urine negative. The abdomen is somewhat distended, and numerous loops of intestine can be seen traversing the abdomen in a ladder pattern. Definite peristalsis noted at times. In the right side of the abdomen there is a large sausage-shaped mass, which extends from the right iliac fossa to beneath the costal margin. This mass is fairly soft, but varies in consistency. Rectal examination negative.

First Operation, August 7, 1906. *Exploratory laparotomy; reduction of intussusception.* An incision was made over the right rectus muscle opposite the umbilicus. The peritoneal cavity was found to contain a small amount of free fluid. The lower portion of the small intestine was greatly distended, being 10 to 12 cm. in diameter, and the walls of the intestine were somewhat hypertrophied. The obstruction was found to be due to an intussusception, 25 cm. long, in the ileocecal region, apparently of the iliaco-ileocolic variety. It was reduced by milking the colon and making slight traction on the ileum. There were few, if any, adhesions and no gangrene. Examination of the ileum after reduction showed the presence of two tumors 3 and 6 cm. in diameter, one 25 cm. above the ileocecal valve, the other and smaller 20 cm. higher up in the intestine. They seemed to be pedunculated, rather spherical in shape, smooth, and fairly soft. The larger tumor was apparently the cause of the intussusception, as traction upon it had caused an umbilication over its attachment, which was near the mesentery. The third tumor, which was about 6 cm. in diameter, was palpated in the sigmoid colon. It was deemed inadvisable to remove any of the growths on account of the distended condition of the bowel. It was thought that this could be done to better advantage at a subsequent operation. The wound was closed without drainage.

Second Operation, August 14, 1906. *Laparotomy; reduction of intussusception; resection of seventeen inches of ileum.* Patient's symptoms were entirely relieved by the first operation until two days ago, when his abdominal pains returned, and today his condition is about as when he was admitted. The wound was reopened and practically the same condition of affairs found as at the former operation. The intussusception was, perhaps, somewhat longer than before, and was reduced with more difficulty, owing to edema of the intestine. About seventeen inches of ileum, containing the two tumors (Fig. 1), was excised. The bowel

was united by a lateral anastomosis and the abdominal wound closed after placing an iodoform gauze drain down to the ends of the intestine, which were brought beneath the lower end of the incision.

Third Operation, October 8, 1906. *Resection of colon and lateral anastomosis of the small intestine.* Since the last operation the patient has done well except that a small intestinal fistula, which resulted, has continued to discharge. It was thought that this might have been kept open by the obstruction produced by the tumor in the sigmoid. An incision was made through the lower portion of the left rectus muscle and about four inches of the sigmoid, containing the tumor, was excised (Fig. 2) and the bowel united by a lateral anastomosis. The intestinal tract was then thoroughly examined for further tumors; none were found in the large intestine, but numerous soft pedunculated tumors were found in the small intestine. One of these, several feet above the former iliac anastomosis, seemed to be producing a slight invagination, so a lateral anastomosis was done, shunting it out. The abdomen was then closed, a small drain being placed down to the large intestine suture.

Fourth Operation, January 3, 1907. *Excision of multiple adenomata of the small intestine, lateral anastomosis of the small intestine; closure of intestinal fistula.* Since the last operation the patient has done nicely, but the intestinal fistula still discharges somewhat. An incision was made through the upper portion of the left rectus muscle. The jejunum was first examined and found to contain numerous soft masses, evidently intra-intestinal growths. One of these was situated just below the junction of the duodenum and jejunum. The growths were removed through small incisions in the intestine opposite to the mesentery, their pedicles being clamped and ligated with catgut. In this manner four tumors 2 to 3 cm. in diameter were removed from the jejunum. The small intestine was then examined systematically from the jejunum downward, and five other growths

found and removed as above. One of these was somewhat sessile, and after excising its base and closing the opening in the intestine, the intestinal lumen was found to be so much narrowed that it was necessary to do a lateral anastomosis around the stricture. The abdominal wound was then closed and the persistent intestinal fistula from the second operation dissected out and sutured.

The patient recovered rapidly after this operation, and was discharged from the hospital on March 8, 1907. To sum up, the following operations were performed upon him: an operative reduction of intussusception, two intestinal resections with lateral anastomoses, two other anastomoses, and seven enterotomies.

He was seen about a year after his discharge from the hospital, and was in good health.

Pathology. The tumors removed vary in size from 1 cm. to 6 cm. in diameter. They are generally of a reddish color, though several are yellow or grayish, and most of them are pedunculated, while a few are more or less sessile. In some the surface is smooth, but most have an irregular, somewhat papillomatous appearance. This is particularly true of the large tumor, causing the original invagination, which has a cauliflower-like structure. They seem to have little, if any, tendency to invade the intestinal wall. Microscopically they present the typical picture of adenomata, namely, a hyperplasia of the glands of Lieberkühn upon a stroma of connective tissue, the glands being very similar to those of the normal mucosa, but are larger and show a greater tendency to branch. At the edges of the larger tumor (Fig. 1) the glands seem to invade the submucosa and thus suggest carcinoma, but the character of the cells does not point to malignancy, and there is apparently no invasion of the lymphatics.

Case II.—*Intussusception Due to a Sarcoma of the Caput Ceci.* Mr. R. K., aged nineteen years, student, was admitted to the University of Virginia Hospital on May 25, 1910,

complaining of pain in the right side of the abdomen and discharge of blood from the bowel.

Family History. Unimportant. No history of tuberculosis or newgrowths.

Personal History. He has had mumps, whooping cough, chickenpox, and recovered without sequelæ. No other diseases. Has had no symptoms pointing to disease of the heart, lungs, or kidneys. Until present illness digestion has been good. Bowels have been regular, and there have been no vomiting of blood, no bloody diarrhea, no hemorrhoids.

Present Illness. Patient was taken sick while in Baltimore, about three or four weeks ago. For about a week patient had had fleeting pains in the lower right abdomen. These became more severe, and at the end of a week he went to bed and took a dose of castor oil. The next day his bowels moved and he passed a good deal of dark blood. The pain in the abdomen became more severe and general, though it was always worse on the right side, and he was taken to the hospital. He was not nauseated, did not vomit, and had no temperature. Blood appeared in each bowel movement, and the pain was always most marked just before the bowels moved. Appendicitis was suspected, but the bloody stools caused this diagnosis to be abandoned. The patient remained in the hospital and gradually became better. The pain disappeared, the hemorrhage from the bowel ceased in ten days, and the patient came to his home in Virginia after fifteen days. Four days after coming home he had another attack. This time the pain was more intense and more sudden in onset, and the patient again passed blood by the bowel. Yesterday he was nauseated, vomited, and, the pain continuing, he was brought to the hospital.

Examination. Patient is a well-nourished young man, but is quite anemic and looks rather sick. Pulse, good volume, fair tension, 84 to the minute; temperature, 99.5°; leukocytes, 11,000. The abdomen is somewhat distended, but no loops of bowel can be seen, and there is no visible

peristalsis. The whole abdomen is rather tense, and no mass can be felt even on deep palpation. There is slight general abdominal tenderness and marked tenderness in the lower right abdomen. An enema was given, and brought away considerable dark bloody material. No definite diagnosis was made.

Operation, May 25, 1910. *Exploratory laparotomy; reduction of cecocolic intussusception and excision of tumor of the caput ceci.* An incision was made through the right rectus muscle opposite to the umbilicus. The small intestine was not much distended, but the large intestine was considerably distended. A soft mass the size of a goose egg was felt in the upper abdomen, and proved to be a large blood clot in the transverse colon. It was milked down into the rectum and a considerable amount of blood expressed from the anus. In the region of the cecum a doughy mass, 13 cm. in length by 7 or 8 cm. in width was felt, and on examination proved to be an intussusception of the cecum. It was purely a colonic intussusception, as the ileocecal junction and appendix were in no wise involved. The intussusception was reduced by milking the colon, and after the reduction a small mass about 6 cm. in transverse diameter by 2 cm. in thickness was felt in the head of the cecum. It was apparently an intestinal polyp which occupied the apex of the intussusception and was doubtless the cause of the intussusception. The intestine was opened at this point and the polyp, which had a pedicle about 2 to 3 cm. in diameter, was excised with an elliptical portion of the wall of the gut. The opening in the intestine was closed with a continuous linen suture, and then the abdominal wound was closed, a small drain being placed down to the intestinal suture. The patient made a good recovery and left the hospital June 18, 1910. He was seen four months later, and appeared to be in excellent health.

Pathology. The tumor, which measures about 6 cm. in transverse diameter by 2.5 cm. in height, is attached to the intestinal wall by a pedicle about 3 cm. in diameter. It is

of a dark red color, has a ragged, somewhat villous looking surface, and is covered by rather adherent blood clots. It seems to show little tendency to invade the intestinal wall.

Microscopic Examination. Section of large intestine. A small bit of normal mucosa is seen at either end of the section. In the rest of the section the mucosa is replaced by a newgrowth which invades the submucosa and extends a short distance into the muscularis. The serosa is normal. The newgrowth is made up of small round cells with moderately darkly staining, somewhat vesicular nuclei, surrounded by a moderate amount of non-granular, lightly staining protoplasm. Very few mitotic figures are seen. There is everywhere a minimum of stroma and many small and large newformed bloodvessels, the tumor cells being in contact with the single layer of endothelium forming the bloodvessel wall.

Diagnosis. Small round-cell sarcoma, arising in the submucosa. Inasmuch as adenomata are the most frequent tumors giving rise to intussusception, and since one of my cases was due to such tumors, it behooves us to study them more carefully. In the following remarks upon adenomata of the intestine the very excellent article of Smoler has been consulted freely.

Adenomata of the intestine are usually found by pathologists in persons who have died from other causes, and in whom the tumors have produced no symptoms. They appear in all parts of the intestine though their favorite seat is the large intestine and especially the rectum. Smoler, who collected all of the cases in the literature, found numerous cases where they occurred in the large intestine and rectum, but only nine cases where they were located in the small intestine. Children from four to seven years of age seem to be chiefly affected.

Adenomata vary greatly in number, size, shape, and color. They may occur singly or, on the other hand, may be found throughout the intestinal tract and number thousands. As a rule, they range in size from that of a pea to that of a walnut,

FIG. 1.—Section of small intestine showing tumors.

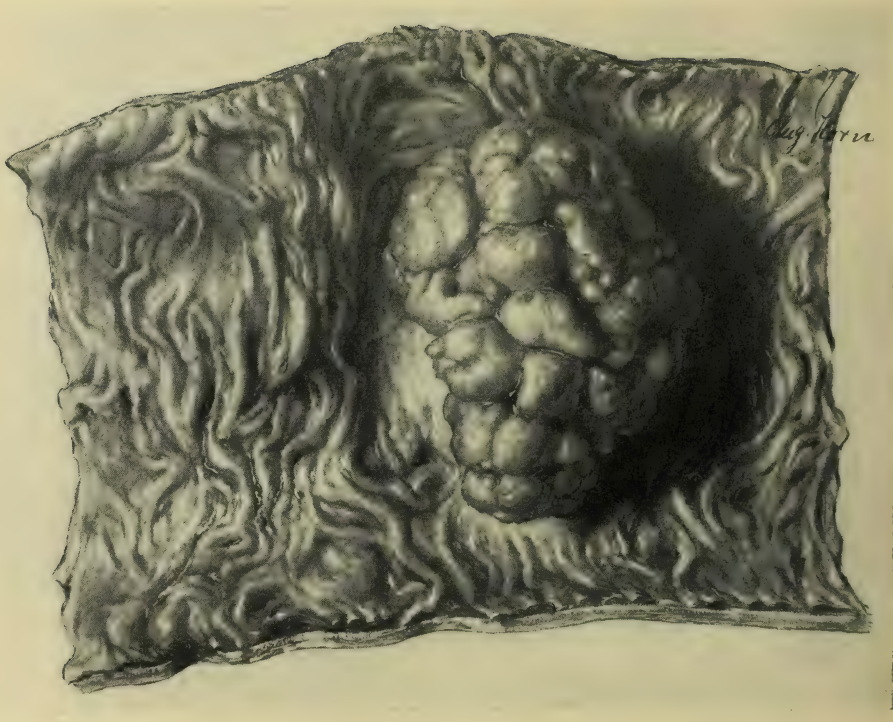

Fig. 2.—Section of large intestine with adenoma.

though they may be as large as an orange. They are sometimes sessile, but are usually pedunculated, are usually red and soft, sometimes firmer, have generally a smooth surface, but not frequently are uneven or cauliflower-like.

They take their origin in the glands of Lieberkühn, and in the duodenum from Brunner's glands, and their structure resembles that of the normal mucosa, but the glands are longer and show a greater tendency to branch. It is sometimes hard to distinguish between benign adenomata and those becoming malignant, and it is impossible to rule out malignancy without a careful examination of all the specimens, especially their edges where they join the normal mucosa. Some say an adenoma is malignant when it extends through the submucosa, others when it extends through the muscularis mucosæ, and still others base their diagnosis on the character of the individual cells. In the adenomata the protoplasm is clear, there is much mucus, and the nuclei are small and dark, whereas in cancer the protoplasm is finely granular, the mucus is less in amount, and the nuclei are large, contain much chromatin, and show active mitosis.

Clinical Symptoms of Adenomata. These are in general somewhat varied and depend chiefly on the size and location of the tumor. A small tumor in the rectum may cause more symptoms than a larger tumor in the small intestine, owing to the firmer nature of the large intestine content, and will, therefore, probably more frequently give rise to hemorrhage; moreover, blood from the small intestine may be so changed as not to be recognized in the feces, though the anemia of the patient may point to bleeding.

Subjective disturbances only appear when the bowel is more or less obstructed. In certain cases the cramps may be due to increased peristalsis or to a small intussusception which becomes reduced spontaneously, but when they are violent and continual, invagination, which is one of the most serious complications, has probably taken place. Many

cases of invagination due to adenomata are chronic, and paroxysms of abdominal pain, occurring at intervals, which intervals tend to become shorter, point to invagination rather than to other forms of chronic obstruction. The presence of mucus and blood in the stools of an adult, with interval cramps and movable abdominal tumor, will often indicate an intussusception due to a benign tumor, and of these the adenomata, though rare, are the most frequent.

The nearer the polyps are to the lower end of the bowel, the greater are the symptoms of irritation. In most cases with polyposis of the large intestine, there is a profuse diarrhea, which may appear daily without pain or cramps. The chronicity of the illness even in these cases (stretching over several years) without great debility in the patient is striking. The diagnosis in cases of polyps of the rectum may be facilitated by the tenesmus and sometimes by prolapsus of the rectum or even of the tumor.

Etiology. The etiology of intestinal adenomata has remained obscure in spite of a great deal of work in this direction. Inasmuch as we find a hyperplastic condition of the intestinal mucosa accompanying certain ulcers and inflammations of the intestinal tract (apparently a reparative process) some invaginators have considered adenomata to be the result of such chronic inflammatory conditions. Thus, some have dysentery to answer for the formation of adenomata, especially since certain forms of polyps have been known to appear after dysentery.

Nothnagel calls attention to the fact that they occur very frequently in children, and König thinks they arise from a congenital anlage. Smoler advances the theory that the presence of a congenital anlage plus a pathological hyperemia, due to inflammation, might account for the formation of adenomata. However, the real etiology of adenomata will probably not be forthcoming until we have a better knowledge of the origin of tumors in general.

Prognosis. The prognosis of intestinal adenoma varies so with the nature of each case that it seems impossible to make any general statement in regard to it. The prognosis will be doubtful or unfavorable when the distribution of the tumors is so extensive that radical operation is out of the question, while single polyps in different parts of the intestine are of better prognostic import. The prognosis, therefore, depends entirely upon the possibility of a radical operative therapy. It is good when the focus of disease can be removed, bad in inoperable cases. The chief complications of adenomata are hemorrhage, invagination, and carcinomatous degeneration. The few cases reported seem to indicate that the last is a rare complication and occurs perhaps more frequently in the sessile than in the pedunculated tumors.

Treatment. Regarding the operation for polyps of the large and small intestine there is not much to say. For single tumors, enterotomy and excision of the growth, after ligation of its pedicle, is recommended. For more extensive involvement, resection of the intestine may be advisable. For invagination, suitable surgery is demanded.

In the very extensive cases of polyposis of the large intestine and rectum the simple removal of the tumors from the rectum is of little value, and can hardly be called a palliative operation, as the symptoms usually return so quickly. Extensive resections, with the production of a new anus, may be necessary, or it may be advisable to shunt out portions of the gut by lateral anastomosis or artificial anus. The use of local astringents and applications may be of service in inoperable cases.

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DISCUSSION

Dr. Hubert A. Royster, of Raleigh.—Like Dr. Watts, I have had two cases of tumors of the gut producing intussusception. In both the tumor was in the ileum, and the invagination produced by the weight of the growth was confined wholly to the small gut. These cases were both benign tumors, and both patients recovered. In each case I was able to do a simple enterotomy, remove the growth, and close the bowel, because the intussusception had not proceeded to the extent of producing gangrene of or interfering with the gut, requiring resection.

The first of these cases was reported before the Florida Medical Association in 1905, and afterward published in the *Medical Record*, of New York. The patient was a man, aged fifty-two years, who had symptoms, more or less, of chronic intestinal obstruction for six months, and the growth proved to be a pure fibroma. The second case, which has not been reported, was operated on February 9, 1910. He was a man, aged twenty-five years, and had had complete intestinal obstruction for four days with fecal vomiting. He had complained for about three or four years of what he called bowel trouble, alternating diarrhea and constipation, and had had one attack

similar to this a year before. He was in collapse, with thready pulse, sunken eyes, delirious, cold clammy skin, the abdomen distended and tender, but no mass was felt. With morphine and hyoscine, and salt solution under the skin, his pulse improved; he was given ether and operated on, the operation being completed in twenty minutes. We found intussusception of the ileum seven inches in extent, produced by the tumor in the gut. This was reduced, and the gut opened by a transverse incision, in accordance with the recommendation of Senn. I found a tumor the size of a large walnut, which was somewhat pedunculated. As in the other case, instead of tying the pedicle by transfixion and cutting it off, I made the incision through the mucous membrane around the base of the growth, lifted it out entirely, and closed over this with fine catgut. The bowel was then sutured in the usual way. The color of the bowel returned, and the patient made an uneventful recovery. This tumor proved to be a submucous angioma, according to the report of the pathologist.

In the report of the first case I referred to the classification of Lichtenstern, and also to a paper by Senn, in which he had reported one case.

The points I wish to bring out in the management of these single tumors are the transverse incision, and the lifting of the tumor out of its bed in the submucosa by an incision through the mucous membrane of the interior of the gut, and not transfixing the pedicle. In the first case I made the usual longitudinal incision in the gut during the enterotomy, but in the second case I adopted the suggestion of Senn and found it much easier. You make a transverse incision, turn the gut back like a stovepipe, get at the growth freely, and close it just as you would a longitudinal incision.

Dr. Guy Le Roy Hunner, of Baltimore.—I have had two cases of benign tumor of the bowel, and each of them illustrates an important point which I will mention.

The first one is the case of an ignorant, elderly woman, who was in a serious condition, evidently from obstruction of the bowel high up, and no good history could be obtained of the case. At the operation I found a large mass apparently in the jejunal region, which was very edematous, and which I took to be a tuberculous hyperplasia of the bowel. For that reason, and because of the patient's bad condition, I decided simply to cut out this section by lateral anastomosis above and below. This was done. The patient lived about a week, as I remember it, and just gradually faded away. I got a post-mortem, and found that the operative results seemed to be satisfactory, but the patient was in a wretched condition at the time of the operation, and as I have said, apparently died

without any particular cause that we could point to. On examining the pathological specimen, I found that the large mass at the site of the intussusception was not tuberculous hyperplasia, as it appeared to be at the time of the operation, but a large fibroid in the bowel lumen. I mention this case because if I were to meet another one I think I would be able to make the diagnosis and undertake a simpler operation. I think if one suspected a tumor within the bowel, he would be able to demonstrate it by pushing it back and forth in the bowel.

The second case turned out to be a lipoma of the sigmoid. This tumor could be felt by rectal examination, and the interesting point about this tumor was the condition of the entire large bowel. Beginning at the sigmoid region, just above the site of the lipoma, the bowel was greatly distended in beadlike fashion by great boluses of fecal matter. The entire large bowel was filled with these fecal boluses, and the intestinal wall was exceedingly thin and contracted around these fecal boluses. In this case, after taking out the tumor, I squeezed out a few of these boluses next to the tumor, and I rather feared the intestine would not recover its peristaltic power enough to carry these masses on beyond the point of the intussusception without a good deal of muscular effort; and fearing another intussusception, I brought this opening to the abdominal wound, and after a few days the bowel recovered its peristaltic power and the big boluses passed through the abdominal wound. The patient made a perfect recovery.

Dr. Rufus B. Hall, of Cincinnati.—I have been very much interested in the paper of Dr. Watts, and I only wish to report a case of intestinal intussusception because of its peculiar interest, not due to a tumor in the intestine, but due, as near as could be determined, to riding a horse; the man, aged fifty-six or fifty-eight years, was not accustomed to horseback riding. During a recent election in the State of Kentucky he was a candidate for some state office, I think school commisisoner. He had been a teacher all of his life. He was a spare man, not very strong physically, and he was doing campaign work in the eastern part of Kentucky in the mountain districts, he told me, and in riding a horse he was compelled to ride that particular day when it was a torture to him, and it jolted him very heavily, so that he got pain in his abdomen. He rode ten miles that day, was exhausted, and completely knocked out after he reached home. He had complete symptoms of obstruction for six days. He was *in extremis*. He had a rapid pulse, and had stercoraceous vomiting several days before, and would not consent to undergo an operation. Finally he gave his consent, and was operated on immediately. As I have said, the man had a rapid pulse and a moderately distended abdomen, more in

the upper half and on the right side. There was no attempt made at diagnosis as to the cause of the obstruction, but an immediate operation was done. He had general peritonitis, with a pint or two of yellow serum in the abdominal cavity, and immediately the abdomen was opened the tumor presented, somewhat the shape of a banana, about nine inches long, and as black as a polished shoe. This was an intussusception of the small intestine; it was about eighteen inches from the lower end, near the head of the colon. This was resected, a Murphy button being used for the purpose of making the anastomosis. The man was put to bed, and died nine hours later. The peculiarity to me was, there could be no pathology found to account for the intussusception. Three feet nine inches of small bowel was crowded into this intussusception, and was cut out, the mesentery cut off, and the usual anastomosis made.

I report this case because it is rather unusual, in that there was no particular pathology to account for this intussusception of the small intestine.

Dr. Watts (closing).—I have very little to add except to say that I have been very much interested in hearing the report of cases of Drs. Royster and Hunner. Dr. Royster is to be congratulated on his case of angioma of the intestine. It is one of the rarest forms of tumor producing intussusception. Dr. Hunner's case of intestinal lipoma was very interesting.

Dr. Hall's remarks bring up the causation of intussusception, notably in those cases in which no definite pathological lesion of the intestine is found. There are few cases reported in the adult in which no definite etiological factor has been found as a cause of the intussusception, but the majority of them are due to definite lesions. An interesting case was reported a few years ago by a Philadelphia man in which intussusception of the small intestine occurred during the course of typhoid fever. He ascribed the intussusception in this case to paresis as the result of toxemia. It also brings up the question of the etiology of intussusception in cases of traumatism of the abdomen, namely, as to whether the intussusception in these cases is due to paresis of the bowel, resulting from the trauma, or whether it is due to an increased peristalsis stimulated by it.

HYPERNEPHROMA ARISING IN THE RIGHT TESTICLE

By James E. Thompson, F.R.C.S. Eng.
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Owing to a strong tendency in recent years to ascribe, rightly or wrongly, the origin of most of the tumors of the kidney to suprarenal rests, it has appeared to me that every tumor of apparent suprarenal origin should be most carefully studied, and that only the cases that are, so to speak, beyond cavil should be accepted as authentic. To this end I have felt it my duty to work up and report the following case of tumor of the testicle, which appears to possess the characteristic features of growths arising from aberrant suprarenal tissue.

S. J., aged twenty years, white, was admitted into the John Sealy Hospital on March 11, 1910. At this time he was in a state of stupor, which deepened into coma, death occurring nine days after admission. With considerable difficulty a history of the case prior to admission was obtained, and it is probably correct in its important details.

Family History. As far back as his grandfather and grandmother, and including his uncles and aunts and brothers and sisters, there is no history of any malignant growth. The patient was the fifth child of a healthy family of ten.

Personal History. Had never contracted any of the exanthemata. There was a negative history of gonorrhea and syphilis. Has enjoyed excellent health.

Present Diseases. In November, 1909, first complained of severe pain in the back (lumbar region of both sides) and in the anterior and upper part of the right thigh. In December he was unable to work on account of these agonizing pains, which were of a deep throbbing nature. Sleep was impossible without opiates. In January he was admitted to St. Mary's Infirmary. At this time the pains were continuous, but almost every other day attacks of excruciating agony occurred, during which the temperature would rise at times as high as 102° F. The blood was examined for malaria, with a negative result. At one time a leukocytosis of 13,000 was observed; but no differential count seems to have been made.

A positive statement was made by the interne in charge that at this time no testicular swelling was present, but the patient's father states that the right testicle had been swollen for years as the result of a blow from a base-ball. A few weeks later a mass was found in the left lumbar region which was thought to be the left kidney. It extended from the costal margin above to the brim of the true pelvis below. A little later pain appeared in the right testicle, which then showed signs of enlargement. This increased very rapidly, reaching the size of an orange in a few days. The urine was examined for tubercle bacilli, with negative results. (A complete urinary analysis was not available.) A few weeks later convulsions occurred. These increased in frequency until as many as twenty were noticed in one day. A few days later he was transferred to the John Sealy Hospital. At this time the patient was in a semicomatose state, general convulsions of a uremic nature appearing somewhat irregularly. They averaged from three to four daily. Vomiting was a prominent symptom. Both lower extremities were slightly edematous.

No urine was passed during the first two days; on the next (March 13) 6 ounces were voided. On March 14, 4 ounces of a blood-red color. On March 15, no urine at all. On March

16, 6 ounces of blood-red urine. On March 17, 6 ounces of blood-red urine. After this time until death, on March 20, no more urine was passed.

Urinary examination showed the reaction alkaline; loaded with albumin; a few lymphocytes and an enormous number of red blood corpuscles.

Blood Count. Red cells, 3,340,000; white cells, 24,000; hemoglobin, 52 per cent. Differential count of leukocytes: Polymorphonuclear neutrophiles, 9.75 per cent.; lymphocytes, 3.75 per cent.; large mononuclear cells, 2.33 per cent.; transitional forms, 1.75 per cent.; eosinophiles, 0.75 per cent.; basophiles, 0.75 per cent. No trace of malarial parasites.

The temperature was not elevated. Only once, on March 17, did it reach 99.4°. The pulse varied in rate between 68 and 128.

Physical examination showed an enlargement of the right testicle to the size of a cocoanut. It was smooth, heavy, tense, and elastic. The scrotum was stretched, and dilated veins showed under the skin. The spermatic cord was thickened and infiltrated. The abdomen was distended and a large mass was evident which seemed to fill up the greater part of the abdominal cavity. It filled both flanks, the whole umbilical region, the upper part of the epigastric region, and the whole right iliac fossa. It was hard and nodular. The diagnosis was: "Sarcoma of the right testicle with secondary deposits in the retroperitoneal glands, causing pressure on both ureters and producing complete suppression of urine. Death occurred on March 20, the patient being in a state of complete coma."

I am deeply indebted to Prof. J. J. Terrell, of the University of Texas, for the following description of the pathological features of the case, and to Dr. Ethel Lyon-Heard, pathologist to the John Sealy Hospital, for the excellent photomicrographs.

Gross Description of Tumor and Metastases

The Testicular Tumor. The right testicle is found to be the seat of a tumor mass, rounded in outline, occupying the whole of the right side of the scrotal sac and having destroyed both testis and epididymis. The outline is smooth, the tumor presents a definite capsule, thin in some places, about 2 mm. in the thickest part. This capsule is lacking in the upper part, where the tumor mass is continuous with a rounded cord about 1.8 cm. in diameter. This cord runs along the course of the spermatic vessels.

On sectioning the tumor, it presents a variegated color, lemon yellow predominating with alternate bands of somewhat translucent fibrous tissue. The entire tumor measures 11 cm. across and bulges distinctly as though under pressure. The lemon yellow areas are soft, at times viscid, and are easily mapped out. The bands of fibrous tissue give the cut section an irregularly lobulated appearance. Some of this tissue macerated with distilled water discharges the color of iodinized starch (Croftan reaction).

Abdominal Mass. Beginning just below the kidneys, extending down to and overlapping the brim of the pelvis, is a large mass of tissue, situated wholly retroperitoneally. It pushes the mesenteric attachment forward and is adherent firmly to the posterior abdominal wall, especially along the bodies of the vertebræ, but without having invaded the vertebræ or inter-vertebral cartilages. The anterior surface of the left side is smooth, while that of the right side is somewhat nodular. The tissue is firm except on the left side, where it is softer, and here on section the mass presents the appearance of macerated brain tissue, the deeper part of which is infiltrated with thick greenish purulent material. The color of the cut section of the rest of the tumor mass varies from red to a canary yellow, in places softened. All through run bands of fibrous tissue subdividing the mass into lobules.

Running from the lower right aspect of this mass is a rounded cord 1.5 cm. in diameter, running along the right brim of the pelvis down to join the testicular mass. This, on section, presents a yellow color with much fibrous tissue. Just external to this cord of tissue runs a large artery, the external iliac. The relation of the ureters to the abdominal mass is important. On the left side it runs superficial to the mass, is flattened, and about midway in its course has been invaded by the tumor which completely occluded the lumen and rendered the walls very friable. The right ureter throughout the greater part of its course runs through the abdominal mass, emerging behind and below the rounded cord. A small probe cannot be passed through the part of the ureter which is enclosed in the tumor mass.

The ureters above these obstructions and the pelves of both kidneys are greatly dilated and filled with clear, light-colored urine.

The pancreas is broad and flat, having a tumor mass posterior to it and above it. Between this tumor mass and the pancreas, one opens into an abscess cavity containing thick yellow purulent material, which is infiltrating on either side. The part of the tumor bounding this posteriorly and superiorly is necrotic, and this part of the pancreas (the head and adjacent part) is inflamed, but the pancreatic duct is not involved by the inflammation nor by the tumor.

The liver has numerous yellowish-white metastatic deposits varying from very minute to from 5 to 8 c.c. across.

Both adrenals were normal grossly and neither of the kidneys showed evidence of tumor growth.

Microscopic Description of the Tumor

A very marked feature through the whole primary testicular tumor as well as the metastases in the abdomen and liver is the great amount of degeneration (Fig. 6, *c;* Fig. 9, *c*).

In such places the nuclear staining is lost, or perhaps only a few chromatic granules or threads. At times the cell outlines are kept, the cytoplasm showing as deeply staining granules or as homogeneous strongly acidophilic masses; again, the whole structure is broken down into granular material lying in the midst of fairly preserved fibrous trabeculæ, and having admixed a certain amount of fibrillar fibrin. Even the smallest secondary deposits in the liver show these degenerations (Fig. 8, *c;* Fig. 9, *c*).

Coming to the better preserved part of the tumor, one finds that it is made up of interlacing strands of fibrous tissue (Fig. 1, *b;* Fig. 2, *b;* Fig. 3, *a;* Fig. 4, *a;* Fig. 9, *b*) bearing the bloodvessels and enclosing in their meshes the essential cells of the tumor. The fibrous tissue shows numerous large spindle nuclei. The essential cells lie upon the trabeculæ (Fig. 2, *d;* Fig. 4, *b;* Fig. 9, *a*), either as a single layer, or two or three layers. In many places the cells of two neighboring trabeculæ come so close together as to resemble a solid mass of cells. In most places, however, they are separated by a distinct space (Fig. 2, *c*). The cells typically are large, being from five to eight times the diameter of the red blood cell. The nucleus is large, rounded or oval, hyperchromatic, at near the centre of the cell, occupying approximately two-thirds the cell. In almost every case the nucleus has one, sometimes two, distinct nucleoli, and these show a rather marked tendency to take the cytoplasmic stain (metachromatic). A fair number of these nuclei show mitoses, usually quite regular in appearance, but in certain instances being irregular in arrangement. At times the cells show several nuclei, a sort of giant cell (Fig. 7, *b*). The cytoplasm of the cells where it can be made out is quite granular, in some of the larger ones vacuolated or vesicular. The cell outlines are fairly good and the cells are set immediately against each other with no intercellular substance.

The bloodvessels which run in the trabeculæ have the walls mostly fibrous tissue (Fig. 4, *c*), and the nuclei of the

endothelia are prominent. In many places the blood has escaped into the spaces between the trabeculæ, and here the blood is in a space immediately surrounded by the essential cells of the tumor, making them practically indistinguishable from the blood spaces in a rapidly growing sarcoma.

Again, in certain areas of degeneration one finds a collection of the tumor cells without the fibrous trabeculæ lying with the granular cell detritus between them, the so-called areas of sarcomatous degeneration (Fig. 7, *a;* Fig. 6, *b*). Sections taken from the abdominal mass on the left side and from near the pancreas show great numbers of polynuclear leukocytes infiltrating the broken-down degenerating tumor material.

The above description holds for the rounded, cordlike mass running from the testicular tumor to the abdominal mass, except that here one finds a greater amount of fibrous tissue of a dense structure (Fig. 3, *b*).

Diagnosis. Hypernephroma of the narrow cell-column type, primary in the testis and metastatic along the cord, to the retroperitoneal lymph-nodes and to the liver.

The part played by segregated portions of the suprarenal body in the production of tumors of the kidney has become of such importance since the writings of Grawitz have become widely known that the pathology of these neoplasms has practically been rewritten within the last decade.

It is now generally conceded that hypernephromata, as compared with other tumors of the kidneys, occur so much more frequently that the tables of the older writers are practically valueless. The statistics of the Massachusetts General Hospital for a period of eight years show that 20 cases of kidney tumor were removed, and out of this number, 17 were hypernephromata, 2 were papillary adenomata and one was a spindle-celled sarcoma. The tables of Israel show the same prevalence of hypernephromata. It may be

safely asserted that all museums where the specimens have been carefully examined tell the same story. The museum of the University of Texas, a comparatively recent collection, does not contain a single case of cancer. There are 3 cases of sarcoma, all of which occurred in young children; 1 case of adenoma, and 10 cases of hypernephroma. The cause of this excessive frequency of hypernephromata must be looked for in the peculiar development of the suprarenal body, which results in the broadcast littering of suprarenal tissue along the organs and ducts developed in connection with the genito-urinary system.

This aberrant tissue (adrenal rests) is of very frequent occurrence. According to Imbert, they are met with in 92 per cent. of all autopsies, a very interesting point being that the kidney is the site in only 8 per cent. of these; a fact which is all the more remarkable when we reflect that tumors arising from these rests are very common in the kidney and very rare in the rest of the body. Adrenal rests are usually found at some point between the lower end of the kidney and the genital gland (ovary or testicle), and it has been found that they usually follow accurately the line of the spermatic or ovarian vessels. Consequently they are quite frequently met with in the broad ligament, just below the ovary (Marchand), and between the testicle and epididymis (Dagonet). In addition, Radasch states that they have been met with in the following situations: In or upon the adrenal, in or upon the kidney, in the perirenal tissue, in the liver, in the solar and renal plexuses, in the mesentery, in the inguinal canal, and in one case on the fundus of the uterus; Marchetti has also found them embedded in a serous cyst of the human ovary and in the ovaries of the guinea-pig (Keen, Pfahler, and Ellis).

The probable explanation of these facts from a developmental point of view is so full of interest that I may be pardoned for introducing the following description: Heisler considers that the suprarenal gland is genetically connected

with the Wolffian body (primitive kidney or mesonephros), but doubts whether it is derived entirely from this source.

It seems to be agreed that it takes its origin from the mesenchymal cells within the Wolffian ridge, but few writers admit that it is derived directly from the glomerular tubules of the Wolffian body. Hertwig and Minot, however, seems to incline to this latter view, and explain it in the following way: From the glomeruli of the primitive kidney epithelial outgrowths bud forth, which divide each into two parts, one of which grows into the indifferent sexual gland to produce part of its structure, while the other turns dorsad and spreads out to form eventually the cortical part of the suprarenal body (Heisler). If this theory is correct, it is easy to understand how portions of the adrenal can become segregated and share the fate of the mesonephros in the descent of the sexual gland, and why these rests are more frequently met with where the mesonephros is vestigial, as in the broad ligament, where the parovarium or paroöphoron lie, and between the testicle and epididymis, where the mesonephros is both functional and vestigial. On the other hand, assuming that the suprarenal is developed from separate mesenchymal cells situated to the inner side of the mesonephros, the proximity is so close that a similar result would be probable. The contention of Janosik that the suprarenal arises from the anterior portion of the genital ridge has little to support it.

It has been previously stated that Imbert found adrenal rests in the kidney in only 8 per cent. of the autopsies where they were present, the overwhelming majority being found along the spermatic vessels and near the genital glands. The reason for their rarity in the former situation is clear when we reflect that the human kidney is developed as a separate organ and has no embryological relationship with the Wolffian body or the sexual glands.

At the beginning of the second month of fetal life a bud forms on the dorsal side of the Wolffian duct near its opening

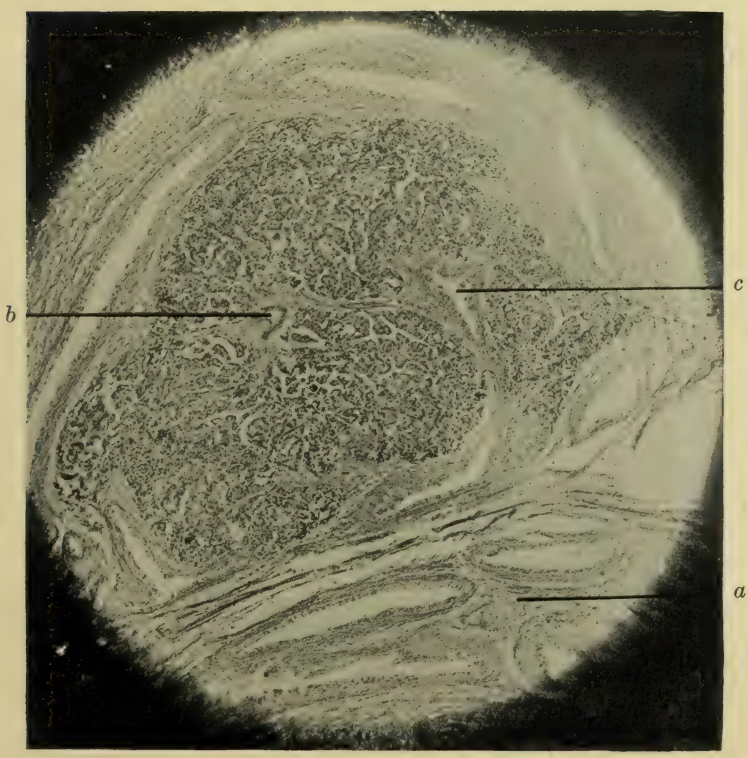

Fig. 1.—Primary hypernephroma of testis. Low power: *a*, fibrous tissue with large bloodvessel and remains of testicular tubules; *b*, fibrous trabecula bearing bloodvessel; *c*, fibrous trabecula with remnant of testicular tubule. For high power of this area, see Fig. 2.

FIG. 2.—Primary hypernephroma of testis. High power. This photograph was taken from the area marked *c* in Fig. 1: *a*, large testicular tubule in fibrous trabecula; *b*, fibrous trabecula; *c*, space between the columns of cells; *d*, the tumor cells set on the trabeculæ.

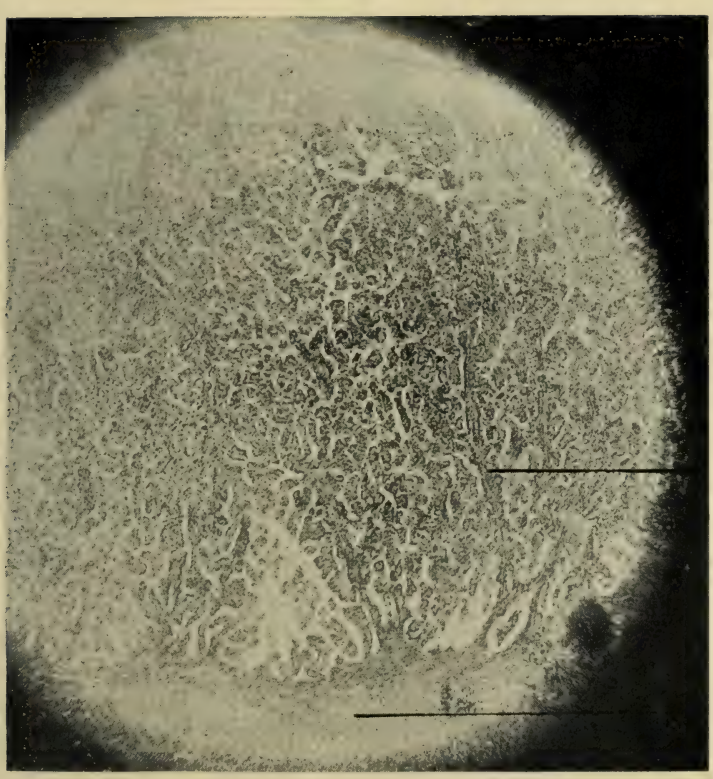

FIG. 3.—Growth of tumor along the cord. Low power: *a*, fibrous trabecula bearing the essential cells; *b*, dense fibrous tissue about the tumor.

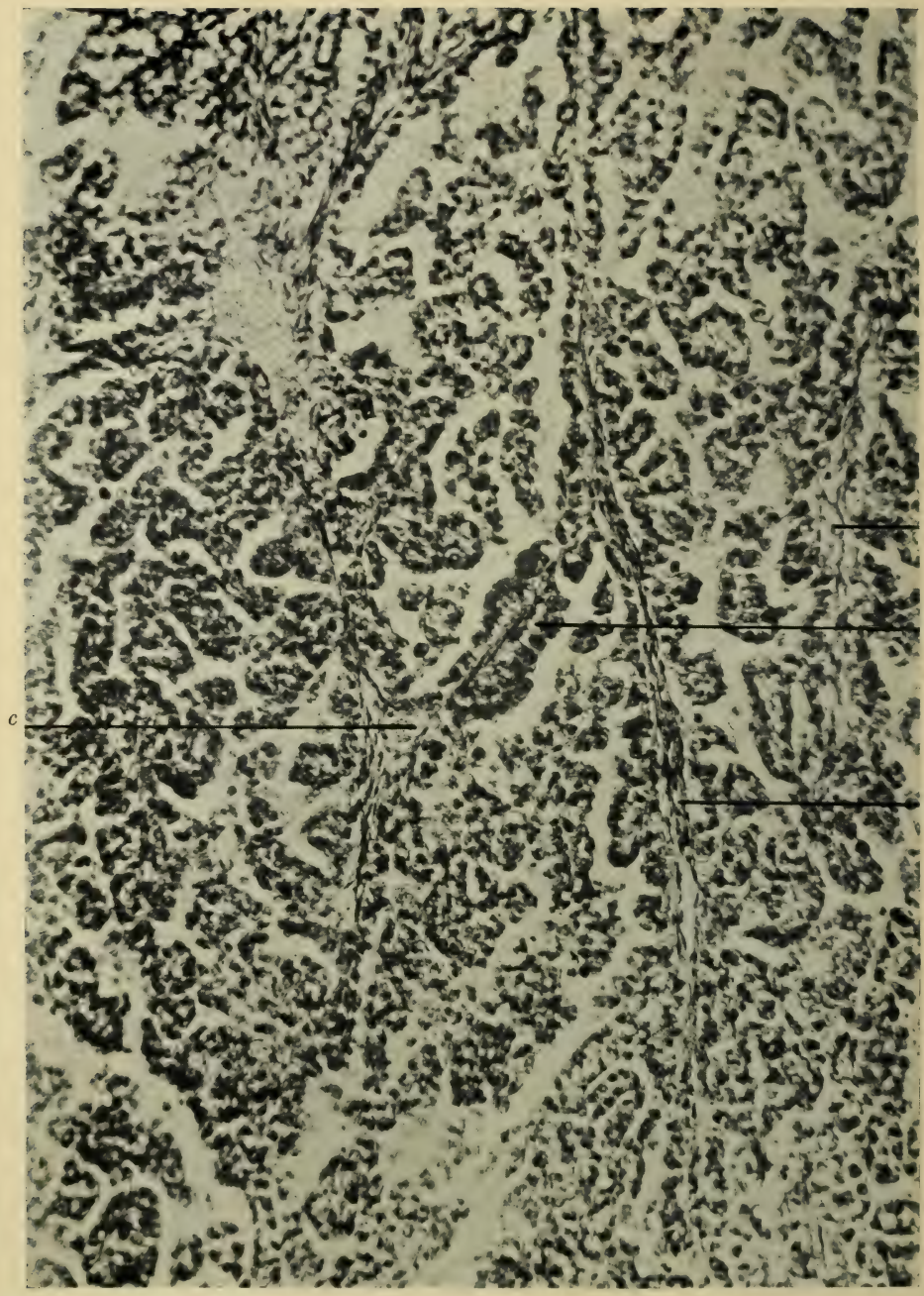

FIG. 4.—Growth of tumor along the cord. High power: *a*, *a*, delicate fibrous trabeculæ; *b*, tumor cells in columns on the trabeculæ; *c*, small bloodvessel in trabecula.

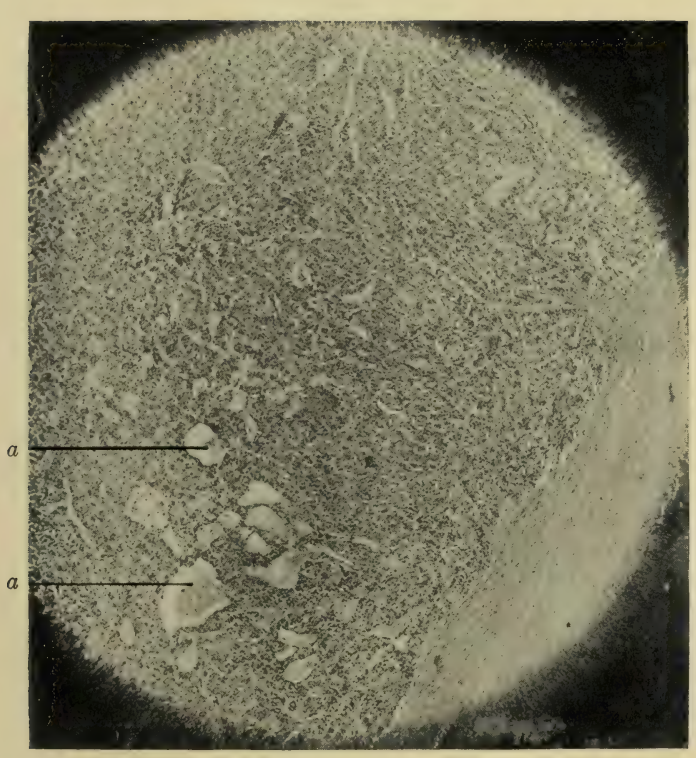

FIG. 5.—Section from the abdominal mass. Low power: *a*, *a*, blood spaces in the midst of the cells. Fig. 6 is from this area.

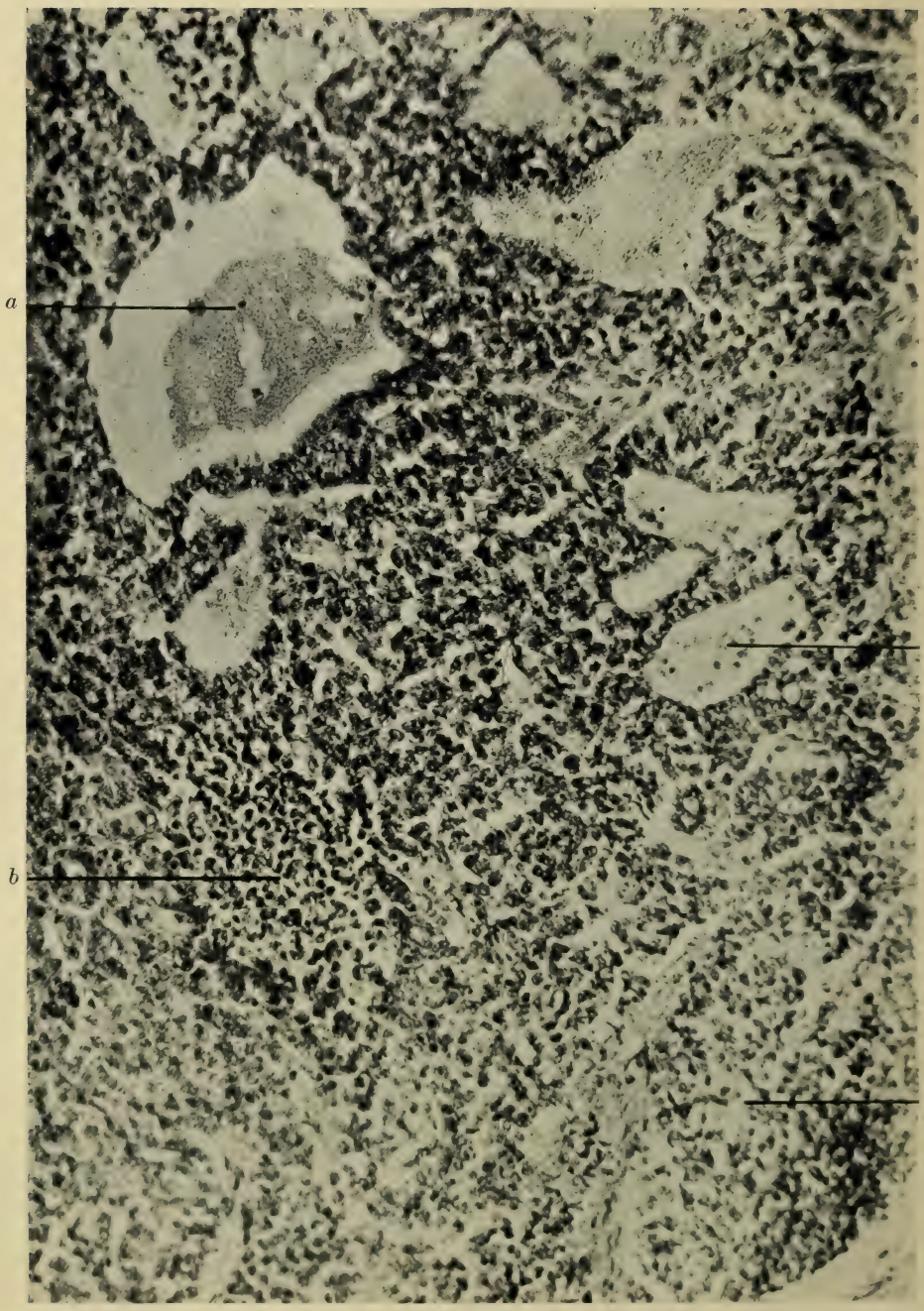

FIG. 6.—Section from the abdominal mass. High power: *a*, *a*, blood in spaces among the cells; *b*, area of "sarcomatous degeneration" (see Fig. 7); *c*, area of degeneration.

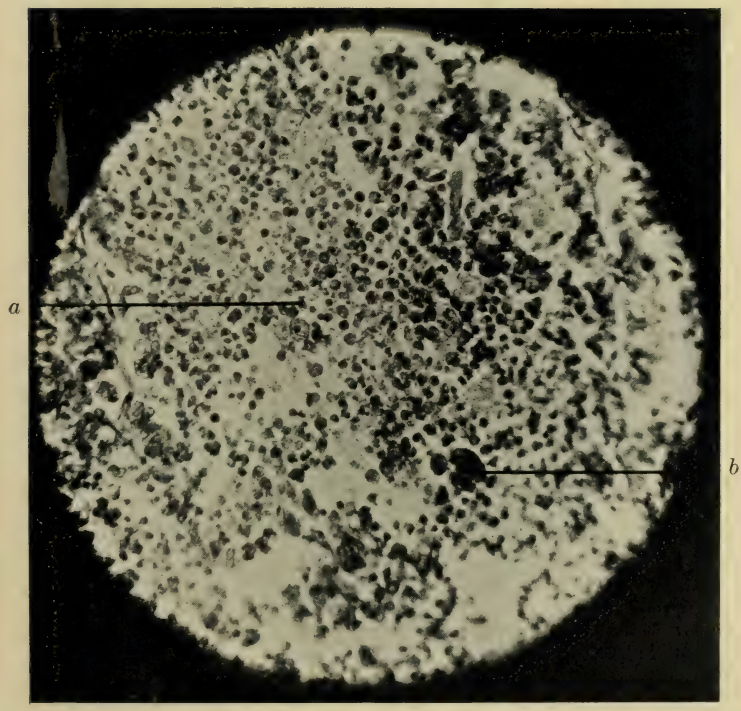

FIG. 7.—Area of "sarcomatous degeneration." High power: *a*, region resembling round-cell sarcoma; *b*, large mass of nuclei, a sort of giant cell.

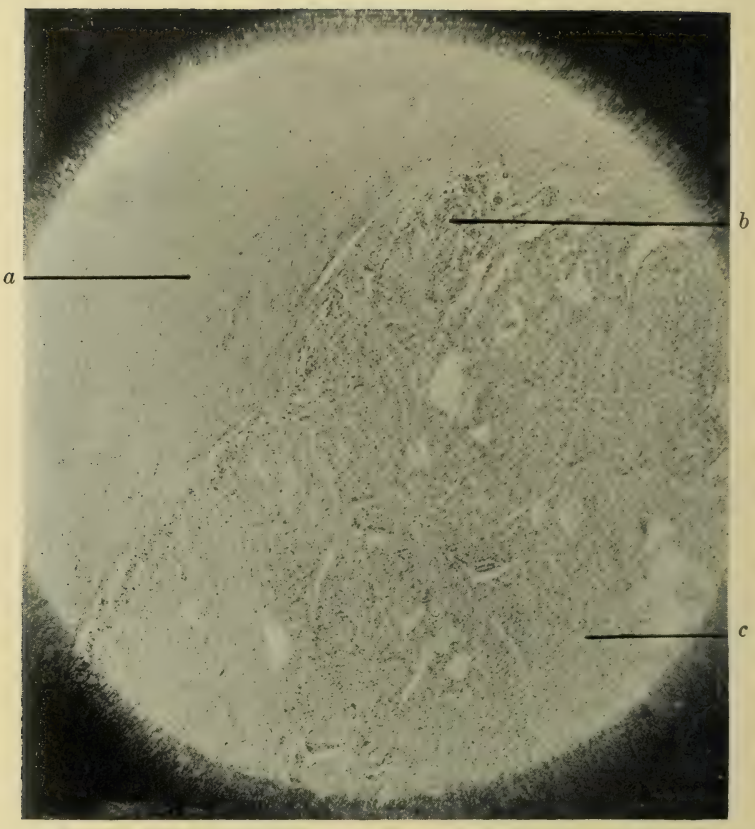

FIG. 8.—Metastasis in liver. Low power: *a*, compressed liver tissue; *b*, the better preserved tumor cells; *c*, area of degeneration.

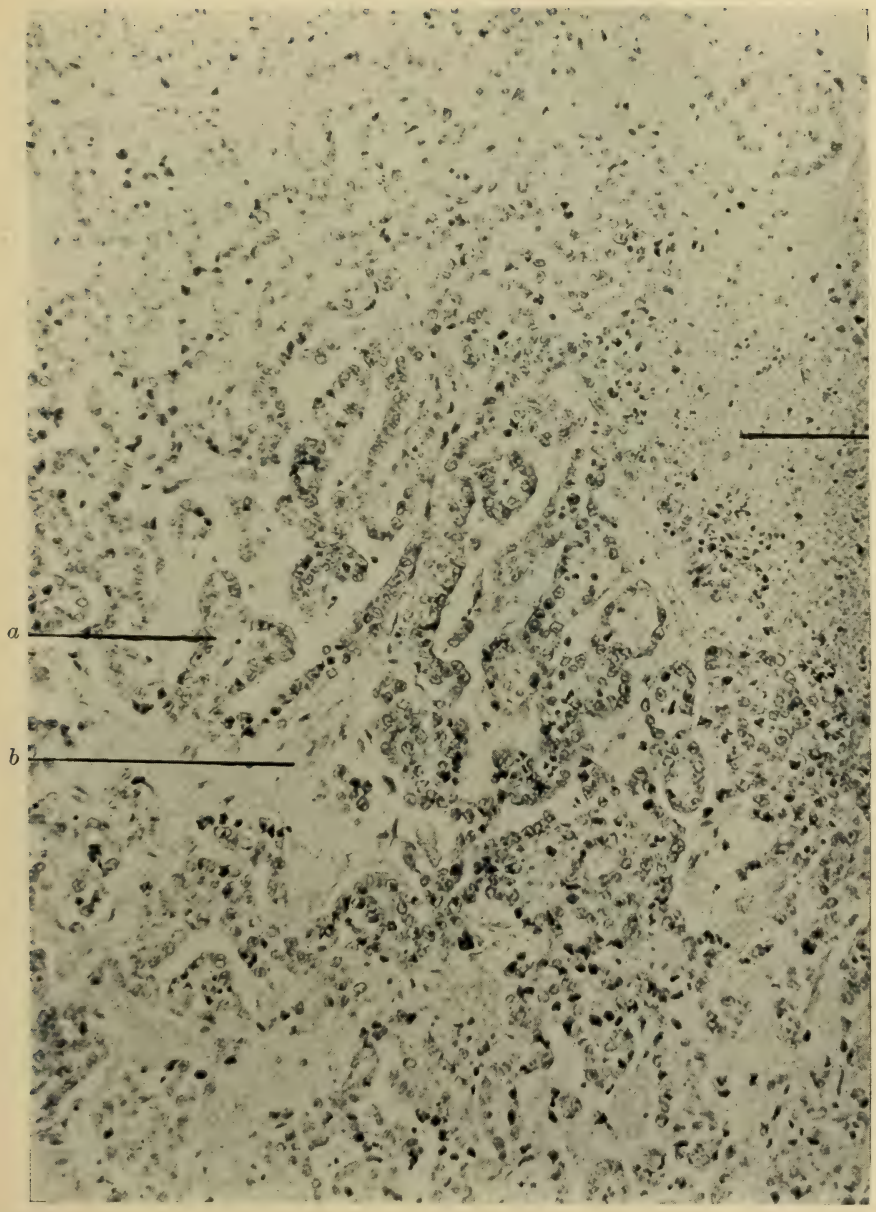

FIG. 9.—Metastasis in liver. High power: *a*, cells set on fibrous trabeculæ; *b*, fibrous trabeculæ; *c*, area of degeneration.

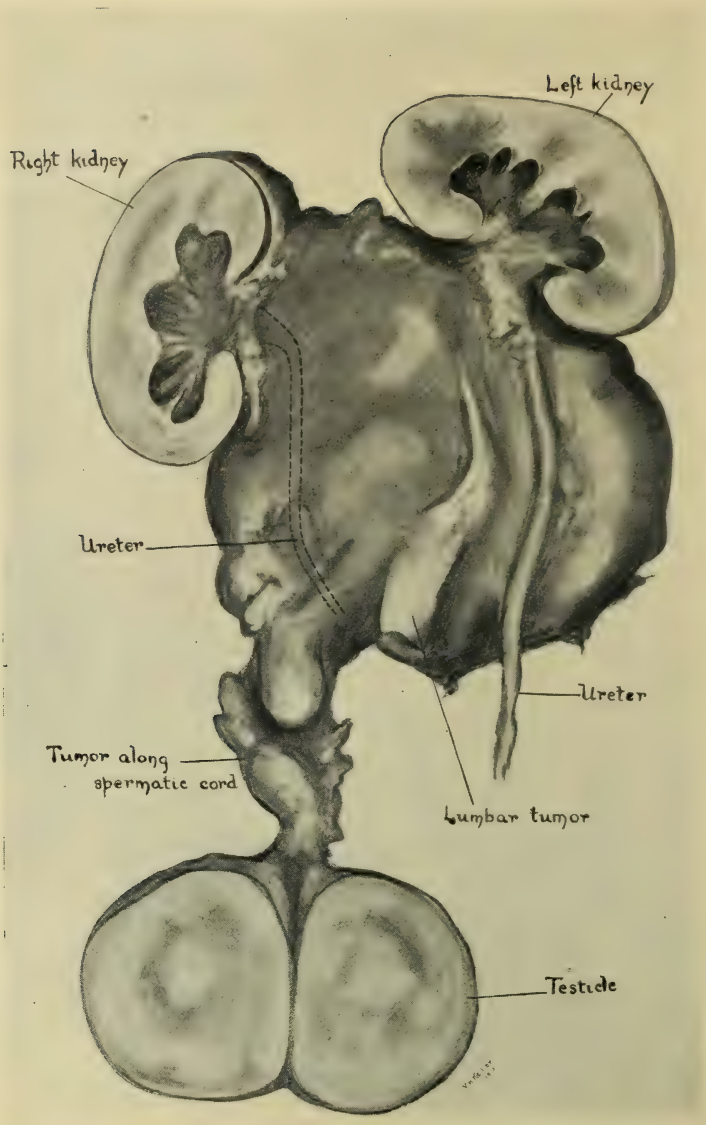
Left kidney
Right kidney
Ureter
Ureter
Tumor along spermatic cord
Lumbar tumor
Testicle

FIG. 10

into the cloaca. A lumen forms in the bud, which extends rapidly forward behind the Wolffian body and behind the peritoneum. The dilated cephalic bud divides into several separate buds, and these form the pelvis of the kidney, its infundibula and calices. The kidney tubles arise on the buds from the groups of epithelial cells on the convex margin of the end of the renal bud and grow out into the intermediate cell mass. The kidney grows forward until it reaches the suprarenal gland, which at first is larger than it and sometimes surrounds it (Keith). The late contact of these two organs leaves less chance for inclusion.

Another important point which may possibly explain the behavior of the kidney pathologically, lies in the fact that the epithelium lining of the lumen of the Wolffian duct is epiblastic in origin (Kollman), and therefore the renal bud springing from it must be of a similar nature.

In looking up the literature bearing on this case, I have found one case only (Stender) of a testicular hypernephroma with metastases in the lumber region, and another case (Chiari) of a primary hypernephroma in the lumbar region. Stender's case is as follows: At an autopsy performed on a man who died with symptoms of exudative peritonitis, a small cancer of the right testicle was found with enormous involvement of the retroperitoneal glands as high as the duodenojejunal junction. The main tumor occupied the space between the right colic flexure and the kidney. The right testicle showed, on section, a soft white tumor, 4 cm. long by 2.8 cm. wide. Microscopic examination of this showed the same findings reported by Chiari in Gussenbauer's case, which suggested the zona fasciculata of the adrenal.

Chiari reports a case where a hypernephroma arose probably from an adrenal rest along the course of the spermatic vein. It occurred in a male, aged forty-four years. The patient was operated upon in the clinic of Gussenbauer for a tumor in the right iliac region, the size of a man's head.

The tumor recurred and grew very rapidly. Another operation was performed under which the patient succumbed.

Microscopic examination of both primary and secondary tumors showed it to be composed of atypically proliferated adrenal tissue.

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DISCUSSION

Dr. William C. MacCarty, of Rochester.—I have recently studied about 50 hypernephromata, and I wish to say in regard to this neoplasm that no tumor in the body illustrates a certain new principle which we are considering in pathology more than the hypernephroma. We must go beyond the three embryonic layers for a classification of tumors in order to explain why some hypernephromata are sarcomata, and others are endotheliomata or carcinomata. The so-called carcinomatous hypernephroma differs considerably from true carcinoma, or carcinoma derived from the epithelium of the tubules of the kidney. We must go back to the original cell because the three layers are derived from it, and are intimately related to it, and differentiation is not so marked when we have the three layers. Hypernephromata demonstrate the necessity of this mode of origin more clearly than any other tumor which we have studied.

PYLOROSPASM

By Stuart McGuire, M.D.
Richmond, Virginia.

Twenty years ago the physician held undisputed sway in the treatment of digestive disturbances, and the suggestion that dyspepsia could be cured by surgery, when medicinal, dietetic, and hygienic measures had failed, would have been regarded as an absurdity.

Ten years ago the surgeon took possession of the field, and for a time the operation of gastro-enterostomy was considered a panacea for all gastric disorders. It was found, however, that while the operation in some cases accomplished brilliant cures, in others it not only did not relieve, but actually increased, the patient's distress.

Today it has been demonstrated that chronic and recurring indigestion is rarely, if ever, due to functional causes, and cannot be cured by efforts to correct errors of secretion. It is almost invariably caused by organic disease of the stomach or other organs, and can only be corrected by operative intervention. In 9 cases out of 10, while the symptoms are gastric, the cause is appendicitis, cholecystitis, pancreatitis, or duodenal ulcer, and while the treatment is surgical, the operation is not done on the stomach. A gastro-enterostomy will cure the symptoms due to an organic obstruction of the pylorus such as results from cicatricial contraction of an ulcer, because it relieves the condition by affording a new exit for the stomach contents. The operation will not cure, but will aggravate the symptoms

due to a spasmodic obstruction of the pylorus such as results reflexly from nervous stimulation, because it overcomes the effort being made by nature to prevent the invasion of the intestines by irritating stomach contents. Obstruction of the pylorus may be organic or spasmodic. The first is mechanical and should be relieved by making a new exit for the stomach contents; the second is nervous and should be relieved by diagnosticating and correcting the cause which produced it.

Spasm of the pylorus, or pylorospasm as it is generally called, is a very common trouble. It is not a disease, but a symptom. It may be caused by rapid eating, by indigestible food, by an ulcer or other lesion of the stomach, but is most frequently the expression of some remote abdominal disease. How appendicitis or cholecystitis causes gastric symptoms has never been satisfactorily explained. It is believed that irritation transmitted to the stomach through the sympathetic nervous system causes an excess secretion of hydrochloric acid. The resulting hyperchlorhydria causes spasm of the pylorus; the pylorospasm causes retention of food beyond the physiological limit, and finally there comes motor insufficiency, food stagnation, and dilatation of the stomach.

The most prominent symptom of pylorospasm is a cramping pain in the epigastrium, which may last only a few minutes or may continue for several hours. In some cases the spasm may relax suddenly; in others it may terminate slowly and gradually. Some patients have attacks several times a day; others at intervals of weeks; and others still only once or twice a year. In the interval between attacks, the digestion may be normal. During attacks peristalsis of the stomach is increased, but food cannot pass through the pylorus, and often relief comes only after vomiting. The patient usually diets strictly, and loses flesh and strength steadily from starvation and auto-intoxication.

During the last few years I have recognized, treated, and

cured a progressively increasing number of cases of pylorospasm. In no other class of patients, with possibly the exception of epileptics, is it necessary to be so thorough in preliminary examination and so patient in postoperative treatment. The real cause of the condition must be found, and after it has been removed the patient must be systematically treated until the hypersensitiveness of the pyloric muscle is relieved, and its spasm habit overcome. This will be well illustrated by one of my first cases.

Miss E., aged thirty-two years, a thin, anemic, and nervous patient, gave a history of chronic dyspepsia attended by frequent attacks of violent pain in the upper abdomen. A diagnosis of gallstones was made and an operation advised. The abdomen was opened, the gall-bladder exposed, and it was found to contain several large gallstones. They were removed, a drain inserted, and the incision closed. No examination was made of other abdominal organs. A week after the operation the patient had a return of her old pain, and the paroxysms became so frequent and distressing that her family was told that it was probable a stone had been overlooked and it was advisable to reopen the abdomen and try to remove it. At the second operation the gall-bladder and ducts were carefully palpated, with negative result. The stomach was then delivered and gone over. The pylorus was found hard and rigid, with a lumen which would not admit the tip of the finger. While handling it in search of evidences of ulceration, the spasm suddenly gave way, the tissues became soft and elastic, and a finger could readily be invaginated through the opening. Then, for the first time, the nature of the case was comprehended. The stomach was normal; the gallstones were an innocent coincidence; the cause of the pylorospasm must be found elsewhere. The appendix, which, until then, had not been suspected of disease, was brought into view. It was inflamed and contained several enteroliths, and was removed. The patient recovered from the operation, but for some months had

recurrence of pain after any imprudence in eating. She was carefully and intelligently treated by her family physician and is now completely well.

This paper is intended only to be suggestive. Its purposes are to impress:

1. The necessity of differentiating between gastric symptoms due to organic disease of the stomach and those reflex from other organs.

2. The impropriety of doing a gastro-enterostomy for spasm of the pylorus.

3. The advisability, at the time of operation, of examining all abdominal organs and correcting every abnormality, lest the obvious may not be the real cause of the symptoms.

4. The importance of the postoperative and posthospital treatment of patients to overcome the spasm habit of the pyloric sphincter.

DISCUSSION

Dr. F. W. Parham, of New Orleans.—This is certainly a very interesting subject and I do not think it ought to go by without some discussion. My attention was first called very emphatically to the existence of pylorospasm, which indicates disease of the stomach, and the trouble elsewhere, some years ago when I was in the Mayo clinic. Dr. Will Mayo opened the abdomen of a patient in which all the evidence pointed toward the stomach as the cause of the trouble. When he got down to the stomach, and brought it into view, he found it was apparently perfectly normal, and expressed the opinion it was normal. He said the trouble must be somewhere else, and, if I am correct, he said, "You will probably notice in a few moments a spasm of the pylorus." So in a few moments we noticed distinctly a spasm of the pylorus coming on. There is nothing in this that shows where the trouble is, but evidently it is not in the stomach, and so Dr. Mayo said, "I will go down and hunt for the appendix." He pulled the appendix up, and found it was distinctly diseased. It seems to me, in these cases, the history is probably more important than the presentation of the case at the time we see it. There was much thought in a paper written some time ago by Moynihan on the inaugural symptoms of disease, in which he calls attention to the necessity of allowing the patient

to give the history of her case just as she will, going back to the origin of the trouble, so far as she can do, in the anamnesis, allowing the patient to tell in her own way all she knows about the first complaint, and occasionally, perhaps very frequently, he said, you will be able to locate the trouble in the anamnesis, when you would be entirely deceived by the case as presented to you long after the pathological process has been under observation. I do not know in a particular case whether we can always expect to find it, but certainly it behooves us in all these cases to give the patient a free range in her description of her case from the beginning of her complaint.

Dr. William C. MacCarty, of Rochester.—You will please pardon me for entering this discussion. It is a subject in which I have been especially interested. Dr. McGuire's paper is certainly an important one just at this time. It is going to stimulate surgeons to consider the stomach, duodenum, pancreas, gall-bladder, and liver as one physiological system. They are embryologically, anatomically, physiologically, and pathologically so closely associated that we cannot speak of one without considering the other. I want to mention here some experimental evidence in favor of pylorospasm due to irritation in the appendix and cecum.

Dr. Cannon has injected irritants in the large bowel of animals and produced muscular retardation of the output of the stomach and intestines. This is an important experimental piece of work. Another investigator (Roger) has caused erosions of the mucosa of the stomach by the injection of betanaphthol in the cecum. I bring these two experimental facts to your attention in connection with Dr. McGuire's admirable paper.

Dr. Henry T. Byford, of Chicago.—There is no doubt that the stomach is frequently effected by irritation in other parts of the abdominal cavity. I had one patient in whom glycerin enemas brought on severe attacks of vomiting every time they were given. I think, however, there is some danger, since attention has been called to the effect of other organs upon the stomach, that operations will be hastily and unnecessarily performed. The improvement following operations is very often the result of care given by the physician, as well as the education of the patient to take better care of her stomach. The greatest amount of stomach disorders come from improper diet and living, and the point I wish to make is, that there is danger of neglect in the study and correction of the patient's habits and ways of living, for the man who has an operation in view, or a diseased appendix in his imagination, is not the man to cure a case of chronic stomach disease due to a systematic application by the patient's wrong notions about diet and nutrition.

I remember an interesting case of gall-bladder disease, with

frequent attacks of pain in the epigastrium and hypochondriac region that sometimes required morphine for relief. I operated, found the gall-bladder embeded in a mass of adhesions, atrophic, and empty. As the adhesions were very firm and could not be separated without considerable hemorrhage, I desisted from all attempts to do anything, and closed the abdomen. I reasoned that the amount of blood oozing from the separated adhesions and drainage that would be necessary would leave fully as many and as firm adhesions as I should have separated, and that the gall-bladder itself had ceased to be the cause of irritation. After the operation I studied her case, and after finding out just what her imprudence in diet had been, and correcting it, her attacks disappeared and she gained flesh. I kept track of her for about fifteen years, during which time she enjoyed good health. She had been under the care of medical men before I saw her. I do not wish to infer that the patient should be dieted and not operated upon when there is a source of disorder that can be removed by operating. I merely wish to protest against operating without a thorough study of each individual case.

Dr. Mack Rogers, of Birmingham.—This condition of pylorospasm is to me only another one of those numerous reflex symptoms of a pathological appendix or gall-bladder, because it has been shown conclusively now that the great majority of cases that apply for relief from indigestion or disturbances of the digestive function, when properly investigated and brought to their last analysis, are really suffering from some trouble with the accessory organs to which Dr. McCarty has referred.

The proper interpretation of these reflex symptoms was brought to my attention one day in Dr. Mayo's clinic, when he made the statement that the majority of their gallstones cases were selected from among those who applied for relief from digestive disturbances.

I think it is wise, as Dr. Parham has just suggested, to give these patients a free rein and permit them to go forward in their own way, and in their own language delineate their symptoms and the order in which they appeared.

I think this very important. The orderly systematic description of their symptoms by them, will, if properly interpreted, go a long way toward making a diagnosis, I find it is a remarkably trustworthy guide in directing me to the diseased organ. The two conditions usually responsible for these reflex symptoms are diseases of the appendix and gall-bladder.

Dr. McGuire (closing).—When I made my first visit to the Mayos, in Rochester, some six or eight years ago, I heard the statement that any case of dyspepsia, which was not relieved in six months by proper medical, dietetic, or hygienic treatment, was a proper case for operative intervention. At this time the

operation of gastro-enterostomy was done on practically all of them. A year or more later I went back to the clinic, when I found the Mayos as busy undoing their gastro-enterostomies as I had found them before in making them. I was told that it had been discovered that while these cases were surgical and required an operation, a large majority of them had nothing the matter with their stomachs, and the gastric symptoms were reflex from a lesion in the appendix or some other abdominal organ. It was stated in a facetious sort of way that when food was introduced into the stomach the inflamed appendix would telegraph to the pylorus and protest against its admission into the small bowel, and as a result there was a spasm which was protective and to that extent physiological. When a gastro-enterostomy was done on such a case, the pylorus was no longer able to shield the appendix, and, as a consequence, the food was dumped on it with the result of great injury. In thinking over this statement, and in trying to find a more satisfactory and scientific explanation for the practical fact which my experience made me accept as true, I came to the conclusion that the inflammation in the appendix produced reflexly through the sympathetic system an excessive secretion of hydrochloric acid that the hyperchlorhydria caused the pylorospasm, and as a result came retention, dilatation, food-stagnation, and auto-intoxication. The object of the paper I have just read was to impress the fact that pylorospasm is nothing but a symptom; that it may be the result of duodenal ulcer, appendicitis, cholecystitis, or pancreatitis. When a patient suffers with pylorospasm, the surgeon should try to find the cause and remove it. The statement of the Mayos is true, namely, that a patient with persistent intractable dyspepsia, who is not relieved by medicinal treatment for six months, is a proper subject for a surgical operation. While the symptoms which make the operation necessary are gastric, the operation in nine cases out of ten should not be on the stomach, but on the appendix, gall-tract, or some other abdominal organ.

With reference to the criticism of Dr. Byford that the case reported did not recover until after some months of treatment at the hands of the family physician, I will state that the same doctor who had treated the patient for two years before the operation, unsuccessfully, was able in three months after the operation to cure the patient by medicinal measures. This was due to the fact that I removed the cause of the pylorospasm, and he was then able to cure the spasm habit which had resulted from long irritation.

TRANSFUSION IN PELLAGRA: REVIEW OF TWENTY CASES

By H. P. Cole, M.D.
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On August 4, 1908, we employed the first transfusion in the terminal stages of pellagra. Encouraged by the immediate improvement and rapid recovery in this case we have since transfused, in collaboration with Dr. Gilman J. Winthrop, 19 additional cases in the terminal stages of the disease.

Whereas, we are unable to draw positive conclusion from this number of cases, we believe that certain valuable deductions may be derived from the statistics which these cases present. We have endeavored to preserve a spirit of skepticism and unbiassed judgment throughout our investigations and to draw accurate conclusions from the data presented.

Transfusion had been resorted to only in the last stages of pellagra, or steadily retrograding under prolonged and careful treatment by approved therapeutic measures. To illustrate the type of cases in which tranfusion has been employed, it is sufficient to state that two cases were moribund at the time of operation, and one case died on the railway train twenty minutes before arriving at Mobile for transfusion. Cases transfused, 20; females, 16, aged twenty-two to fifty-three years; males, 4, aged three to forty-two years.

We note that the females (16, 80 per cent.) were four times as frequent as the males (4, 20 per cent.) Recoveries, 12, 60 per cent.; deaths, 8, 40 per cent.; relapse, 1, 8.3 per

cent. (This relapse occurred two years after recovery in an institutional case exposed to re-infection.)

Temporary improvement followed by death, 2 cases; no improvement following transfusion, 6 cases; complications incompatible with recovery, 2 cases. (Case 1, a male, aged forty-two years, complicated with tubercular peritonitis, showed temporary improvement for several days, died one month after the operation. Case 2, male, aged three years, showed distinct improvement following transfusion, but died eight days later with intestinal perforation.)

Complications presenting insufficient flow of blood, followed by death, 2 cases. (Case 1, the only available donor permitted insufficient transfusion through a severe degree of arteriosclerosis. Case No. 2, inadequate operative surroundings and a neurotic, fourteen-year-old boy as the only available donor, permitted insufficient transfusion.)

Cases moribund at operation followed by death, 2 cases.

It will be noted that 4 of the 8 cases in which death resulted might well be excluded, for the following reasons: Two received an inadequate amount of blood at transfusion and two were moribund at time of operation. Excluding these cases the mortality rate would be 25 per cent. as compared to the 40 per cent. in the entire series. Considering the grave mortality rate in the type of cases upon which transfusion was performed, we can but feel that our mortality rate of 40 per cent. in the entire 20 cases compares most favorably with the mortality (80 to 90 per cent.) in this type of cases, treated by other therapeutic procedures. We have been unable to observe that transfusion was a direct factor of death in any of the cases; the deaths followed in periods of from three hours to one month after operation. One case manifested symptoms of cocainism, necessitating a termination of transfusion at the end of fifteen minutes. This case, however, made an excellent recovery from pellagra. Neither hemolysis, agglutination, thrombosis, nor embolism have been observed in any of the cases.

Of the recovered cases (17) there were: females, 11 (68.8 per cent. of females); and males, 1 (25 per cent. of males). We note a far greater percentage of recovery in the females. All the recovered cases presented distinct and severe lesions of pellagra; there was marked emaciation, asthenia, anemia, reflex excitability, and in many cases grave mental changes. Severe pellagra erythema, stomatitis, and diarrhea were present in a majority of cases. Within a few days after transfusion there was either alleviation or disappearance of all the symptoms of pellagra; there was a rapid disappearance of the pellagra erythema, stomatitis, and diarrhea. There was a gradual alleviation of the mental and nervous symptoms. In several cases there was an astonishing improvement in the patient's mental condition, shortly following operation. In all cases there was rapid increase in the patient's hemoglobin index, a rapid return of body strength, a return of digestive faculties, and increase in body weight. All the recovered cases gained from 3 to $8\frac{1}{2}$ pounds in the first week following transfusion, one case gaining 34 pounds within 11 weeks. All of the recovered cases have returned to a normal condition within from one to four months after operation None of the cases present any of the symptoms or signs of pellagra, and several are in better physical condition than they have presented for years. The case relapsing two years after transfusion was living in an institution and was constantly exposed to pellagra. Remaining free from pellagra symptoms for a period of two years, it is fair to assume that this case may be considered a re-infection, rather than a relapse.

It is but just to state that all approved therapeutic procedures were employed in the recovered cases, both previous to and following the operation. As these procedures were employed without beneficial effect previous to the operation, it is plausible to assume that they were unimportant factors in the recoveries after transfusion.

We have been unable to ascertain a constant clinical

sign that would indicate a certainty of recovery following transfusion. Cases presented for transfusion in a moribund state and cases complicated by other grave pathological conditions, contraindicate the employment of transfusion. The necessity of resorting to transfusion can only be ascertained upon the appearance of positive signs of retrogression under approved institutional and constitutional therapeutic agents.

A majority of the cases referred for transfusion have recovered through hygienic supportive treatment, not necessitating the employment of transfusion.

Transfusion, itself a delicate procedure, should be attempted only by those experienced in the technique, with a full knowledge of the dangers of the operation, and in adequate surroundings for its performance, and the proper post-operative treatment.

In these transfusions we have endeavored to employ donors who have lived in the same environment as the recipients, assuming that such donors who have not contracted pellagra possess a certain degree of immunity.

Transfusion was resorted to from donors who had recovered from pellagra in 3 cases; recovery occurred in one case ($33\frac{1}{3}$ per cent.). (This case relapsed two years following transfusion.)

Transfusion from donors who had never had pellagra, 17 cases; recovery in 11 cases (64.7 per cent.). We may assume that there is, at least, no preference of a donor who has had pellagra over a donor who has never had pellagra.

Transfusion was resorted to from donors who were relatives, but who had never had pellagra, in 7 cases; recovery in 3 cases (42.8 per cent.).

Transfusion from non-relative donors who had never had pellagra, 10 cases; recovery in 8 cases (80 per cent.). Here we may assume, at least, that there is no preference in the use of a relative over the use of a non-relative.

We are unable to state from the statistics available that

there is any immune principle transferred by transfusion. It is probable that any beneficial results obtained may be attributed to the relief of the existing anemia, permitting the patient's organism to approach its normal functional activities and thus combat the progress of the disease.

Conclusions. In the transfusion of 20 cases of pellagra, we have found no ill effect resulting directly from the operation. We may safely resort to transfusion in the severe type of case steadily retrogressing, under approved therapeutic procedures.

We have noted no advantage in the employment of a donor who has recovered from pellagra as compared with the donor who has never had pellagra.

There is apparently no advantage in the use of a relative for a donor as compared to the use of a non-relative.

The recoveries following transfusion in the grave type of cases (60 per cent.) compares most favorably with the recoveries (10 to 20 per cent.) in the same type of cases in which other therapeutic measures are employed.

The employment of transfusion in the terminal stages of pellagra must be undertaken with a full knowledge of the difficulties and dangers of the operation. Without careful selection of the cases and unprejudiced conclusions, this procedure will fall into "an undeserved ill-repute."

DISCUSSION

Dr. J. W. Long, of Greensboro.—Pellagra is one of the newer problems with which we have to deal, and that it is one of gigantic magnitude is evidenced by the statistics as gathered by Dr. W. S. Rankin, Secretary of the North Carolina State Board of Health. He has shown that during this year between five hunderd and one thousand people have died of pellagra in North Carolina, as many as have died from typhoid fever.

Pellagra, like typhoid fever and the other acute infectious diseases, has its surgical aspects. For many years I have done no general practice, and yet since the question of pellagra has been brought to the front, no less than 30 cases have turned up

in my hospital and consultation practice; therefore, I feel very much interested in the paper which Dr. Cole has presented to us.

I have had one case of acute pellagra develop in a young woman upon whom I had done an abdominal section before she left the hospital; she made an operative recovery, but went home with her pellagra, and after about two months succumbed to the disease.

I did an abdominal section on another patient who had chronic pellagra. The operation did not seem to affect the course of the pellagra, making her neither worse nor better.

A recent (and the only) case I have transfused, was a woman who had been operated on by Dr. Kelly, of Baltimore, in the latter part of the last summer. Before she left his hospital she had acute pellagra. She was brought to Greensboro on her way home. Her people lived there, and she became very ill, growing rapidly worse with the pellagra. She was brought to St. Leo's Hospital in order that I might transfuse her. We selected, as a donor, a healthy-looking man, an engineer by occupation, who had had pellagra a year before, and was apparently cured. I let the blood run slowly for forty-five minutes, and the patient, an intelligent woman, said, "I feel better than I have felt for months." That was while the blood was running. She had no untoward symptoms. While on the table there was great improvement in her pulse, in the tension of the arteries, and in her color. We were much elated at the immediate outcome of the transfusion, and for about ten days she was so very much improved that she left the hospital, and was taken back to her people's home. After that the pellagra reasserted itself and she succumbed to the disease.

In doing this little operation of transfusion, it should be remembered that it is not entirely free from danger, because of the ever-present possibility of an acute dilatation of the recipient's right side of the heart. For instance, in September I saw Crile doing transfusion, and acute dilatation of the right side of the heart developed while he was operating. As you know, Crile is the great apostle of transfusion in this country. He had a most experienced man to watch for the heart dilatation, and fortunately it was readily overcome, but it was present, and I mention it to show you that while transfusion is seemingly a simple procedure, it is one that should be undertaken with caution.

There are so few cases of transfusion that have been done for this disease that I feel like adding this report to Dr. Cole's interesting paper.

Dr. Cole (closing).—In reference to acute dilatation of the heart, which was referred to by Dr. Long, that is one of the dan-

gers of transfusion, but it is readily controlled with the Crile clamp, or with pressure with the finger on the vein, and slow transfusion. Personally, I have never had a case of acute dilatation of the heart. I have been with Dr. Crile when he has had a case in which there was slight dilatation of the heart, but that, when present, can be controlled by putting the patient in the standing posture and stopping the transfusion.

As to the other cases, I am sorry Dr. Goldsmith, of Atlanta, is not here, because he wrote me a very encouraging letter, saying that he would report 5 cases which he has transfused, with recovery, I believe, in 4 of the 5 cases.

There is one point I want to emphasize, and that is, I have never resorted to transfusion except in a case I considered hopeless, and a case that has either been under my own observation or that of a physician for several weeks, and has been given careful treatment. I have used it as a last resort.

Since this review was made I have transfused 4 other cases in the last three or four weeks. Two of them were cases that would have recovered without transfusion, but I transfused at the insistence of the family. There are one or two isolated cases reported in which transfusion was thought to be very beneficial, but the most encouragement I have received was from a personal letter, written by the late Cæsare Lombroso. This letter was probably one of the last letters he wrote before he died, in which he stated to me (and the correspondence was unsolicited) that he had great hope for some such procedure, and further stated that I had been antedated four years in this work by two of his co-workers; that these gentlemen in a number of cases had withdrawn the blood from patients who had recovered from typhoid pellagra, and, after defibrinating, had injected it in small and repeated doses in patients dying with typhoid pellagra, with recovery in a number of cases. I have heard no further reports from the Italian work.

COMPLETE TRANSVERSE DESTRUCTION OF THE SPINAL CORD FROM PISTOL WOUND, WITHOUT PENETRATION OF THE SPINAL CANAL

WITH A CONSIDERATION OF CONCUSSION AS AN ETIOLOGICAL FACTOR IN THE PRODUCTION OF THIS LESION, AND OF THE QUESTION OF SUTURING THE CORD WHEN IT IS COMPLETELY DIVIDED.

By Randolph Winslow, M.D., LL.D.
Baltimore, Maryland.

The following cases of injury to the spinal cord from pistol shot, without penetration of the spinal canal, appear to me to be of sufficient interest to justify their recital.

Case I.—On October 9, 1910, E. F., white male, aged twenty-four years, was shot with a pistol in the left side, the bullet entering between the seventh and eighth ribs just posterior to the midaxillary line. He fell immediately to the ground and was paralyzed from near the umbilicus downward, both as regards sensation and motion. He did not lose consciousness, but complained of severe pain in the upper abdomen and in the chest. He was brought to the University Hospital a short time after the injury, and the following facts were elicited by Professor Irving J. Spear: The patient shows complete muscular and sensory paralysis below a line extending around the body one and one-half inches below the umbilicus in the median line in front and curving upward and backward along the upper

border of the twelfth rib to the spine. An area of hyperesthesia exists, encircling the body, three inches in diameter, just above the line of paralysis. There is persistent priapism; cremasteric and slight plantar reflexes are present, but the patellar and tendo-Achilles reflexes are absent. The paralysis is flaccid in type. There is inability to void urine and catheterization is necessary; the bowels do not move except with enemata. Ankle clonus, and Kernig's and Babinski's signs are negative. Neurological diagnosis: Complete transverse destruction of the cord at the ninth dorsal segment opposite the seventh or eighth dorsal vertebra; and it is proper to say that Professor Spear advised that no operation be performed.

Irregular exacerbations of temperature promptly supervened, but his general condition remained good. An *x*-ray picture showed the bullet in or about the body of the eighth dorsal vertebra. Believing there was a complete division of the spinal cord, and having in memory the cases of Stewart and Fowler, I determined to explore the spinal canal and suture the cord if it was found to be justifiable. Accordingly, three days later I did a laminectomy, removing the laminæ of the seventh, eighth, ninth, and tenth dorsal vertebræ. There was no blood in the canal, and the dura was uninjured, nor was the bullet discovered. The dura was widely opened, permitting the escape of a large quantity of cerebrospinal fluid. The cord was not severed, nor did it appear to be altered, but subsequently some grumous material escaped from the cord. As the cord was not divided, or its continuity apparently destroyed, there was nothing to suture and the wound was closed. The patient was not improved, but neither was he made worse by the exploration, as his wound healed per priman. He continued, however, to have fever, became emaciated, and bedsores formed, but he is still living at this writing.

Case II.—On May 2, 1884, the following case of gunshot of the spine was admitted to University Hospital under my

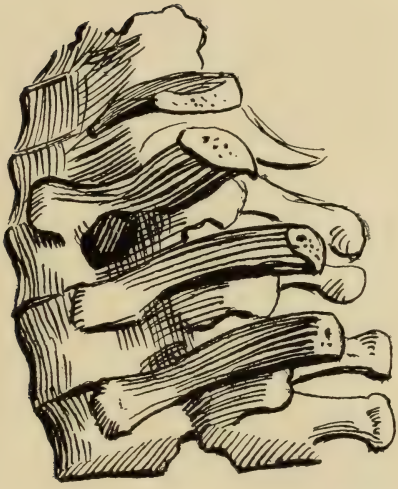

FIG. 1.—Bullet lodged in body of second dorsal vertebra.

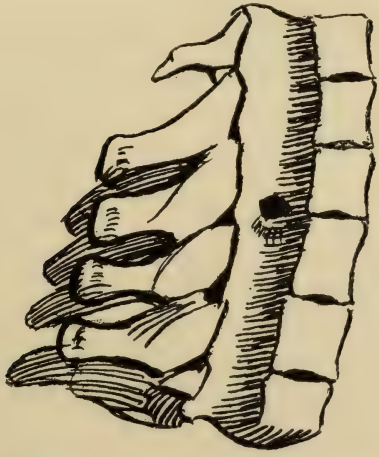

FIG. 2.—Point of bullet seen from the spinal canal.

care. Martha Gordon, colored, aged eighteen years, was shot a short time previously by a woman, the bullet, from a Colt's revolver held at short range while the patient was sitting, entered on the left side of the neck about the middle of the belly of the sternocleidomastoid muscle and passed downward, inward, and backward. The victim fell forward with paraplegia, and also with paralysis of the left arm, dilatation of the left pupil, alteration of the pulse, and coldness of the skin. Subsequently sensation and motion were partially restored to the left arm. The right arm was unaffected. Complete anesthesia extended to the first rib on the left, and only to the third rib on the right side. There was retention of both urine and feces, requiring the use of the catheter for the one and enemata for the other. Her mind was clear. There was some pain in the neck. The diaphragm was unaffected, and some action of the serratus magnus could be elicited. She subsequently complained of a burning sensation below the waist, and of a band around the body, as well as of pain in the spine. Bedsores promptly formed. The reflexes were abolished, and the muscles of the legs responded vigorously to the faradic current. The highest temperature was on the ninth day, when it reached 104.8° F., the lowest temperature was recorded on the fourteenth day, when it fell to 98°, soon rising to 104.2°.

Diagnosis: Pistol wound of the second dorsal vertebra, crushing or otherwise injuring the spinal cord.

Death occured on the twenty-first day following the injury.

Autopsy by the late Professor Michael: The bullet cut the posterior margin of the left sternocleidomastoid muscle, passed behind the brachial plexus, cutting a small nerve, probably the last branch of the cervical plexus, then passed between the anterior and middle scaleni muscles, broke the tip of the transverse process of the seventh cervical vertebra, penetrated the body of the second dorsal vertebra, cutting also a piece from the first rib and impinged on but did not penetrate the spinal canal, also fracturing slightly

the pedicle of the second dorsal vertebra. There was some bloody serum in the canal, and spinal meningitis was present. The cord was not penetrated or compressed, but was disintegrated, and much reduced in size opposite the location of the bullet.

The above reported cases appear to me to be injuries due to concussion of the spinal cord, though it is difficult to understand how a complete transverse destruction of the cord can occur without a direct impact; that such does occur occasionally is, however, well attested by competent authorities. During the Civil War a number of such examples were observed. My late colleague, Professor Julian J. Chisolm,[1] in his *Manual of Military Surgery*, written for the use of the surgeons of the Confederate Army, says: "A concussion produced by the explosion of a shell in the immediate vicinity of the back is an injury not infrequently met with in field practice, having as its most conspicuous symptoms pain in the vicinity of the part, accompanied by impairment of mobility and sensation of the lower limbs, amounting at times to paralysis. As the result of such a concussion, blood may be effused within the sheath of the cord, causing paralysis from pressure. A chronic and eventually fatal myelitis may supervene upon this extravasation."

Surgeon-General Robert M. O'Reilly,[2] U. S. A., also makes about the same statement. He says: "Concussion, unless it is severe, is usually more or less rapidly recovered from. Concussion of the spinal cord by gunshot is due to the shock of the impact of the missile, or the molecular vibrations set up by the passage of a missile at high velocity near the cord. The effect of such injury may be transitory pain and loss of muscular control, or complete paralysis and anesthesia with persistent pain and general neurasthenic symptoms. Destruction of the cord may arise as the result of the transmission of energy from a missile at high velocity passing near the cord. It has occurred in cases where the bullet barely grazed the membranes of the cord. The cord is

reduced for some extent to a custard-like material and is as completely and permanently destroyed as though it had been severed by a missile."

Surgeon-Colonel W. F. Stevenson,[3] of the English Army, also says: "Concussion of the cord without fracture of the spinal column may be produced by shell fragments or by small arm projectiles. In these cases paralysis below the seat of injury may be absolute; but if secondary changes do not take place in the cord, and hemorrhage within the spinal canal does not occur, recovery may be rapid and complete." He cites the case of an officer wounded in Afghanistan which is of interest in this connection. "The bullet traversed the muscles over the lumbar region from side to side, not implicating the bone in the passage; absolute paralysis of both lower extremit es occurred immediately on receipt of injury, and continued for about a week, when it began to diminish and soon completely disappeared."

I will cite two other cases reported by men whose names are a sufficient guarantee of the correctness of their observations, made during the heat of the Civil War. Dr. Robert F. Weir[4] records the case of a man wounded on July 9, 1864. The bullet entered the anterior part of the neck to the left of the thyroid cartilage and passed between the roots of the seventh cervical and first dorsal vertebræ. By August 4 the wounds of entrance and exit had healed, but large bedsores had formed, and there was entire paraplegia, involuntary discharges of urine and feces, and diarrhea, and he died on August 12. At autopsy some slight bloody effusion was found in the canal, but no direct injury to the cord.

The other case was observed and recorded by Dr. William W. Keen:[5] A man was shot through the upper lip, all the teeth on the same side of the upper jaw were destroyed and the bullet penetrated the posterior wall of the pharynx and lodged in the body of the third cervical vertebra. Paralysis of all four limbs supervened, from which he rapidly recovered. Nearly all of the body of the third cervical

vertebra came away, but the man recovered, though with some disability.

Dr. Francis T. Stewart,[6] of Philadelphia, also records two cases, occurr ng in civil practice, o gunshot wound close to but not involving the dorsal cord, in which there were typical signs of a total transverse lesion, but in which a postmortem examination revealed no anatomical changes in the cord.

The treatment of complete or apparently complete division of the spinal cord is still a mooted question. Physiologists declare that it is impossible to have a regeneration of the cord if it has once been divided, but practically there may be a doubt of the correctness of this statement. Improvement certainly does occur to some extent in certain cases that are treated expectantly; perhaps some fibers of the cord have escaped destruction, or there may have been a species of collateral nervous anastomosis between the nerve fibers above the injury with those below it.

In the case of gunshot wounds of the spinal cord it certainly appears to me to be justifiable to explore the spinal canal, remove foreign bodies, and suture the divided ends of the cord together. We must be careful, however, not to destroy fibers that may be still uninjured. In one of the cases reported above an exploration of the spinal canal was made, but there was no hiatus in the cord, though apparent y a hematomyelia had occurred, as a grumous material escaped from the cord itself. I did not think it justifiable to resect and suture the cord in this case. So far as I am aware, the severed spinal cord has been sutured but three times.

On January 21, 1901, Dr. Francis T. Stewart,[7] of Philadelphia, seems to have performed the first suturing of the cord in a human being. This was in a case of gunshot of the dorsal spine. Three hours after the injury an exploratory laminectomy was done, and the cord was found to be completely divided, with the ends separated three-fourths of an inch from each other, and the bullet and some bone

fragments lying in the spinal canal between the severed ends of the cord. The laminæ of the seventh dorsal vertebra were fractured. The edges of the cord were freshened and the ends were approximated with three chromicised catgut sutures. The patient, who had been paraplegic, with the loss of reflexes below the seat of injury, soon exhibited marked improvement, and sixteen months later was able to execute various movements of the toes and legs, could stand with one hand resting on the back of a chair, and by a sliding movement could get from her bed to a chair unaided. The bowels were under control and the urine so when she was awake, though some incontinence occasionally occurred during sleep. The sense of touch, pain, temperature, and position was preserved over the previously paralyzed area.

The next case chronologically, so far as I am aware, is that of George R. Fowler,[8] who did a laminectomy for gunshot of the eleventh dorsal vertebra, eleven days after injury, and found the cord entirely severed, with the bullet lying between the divided ends. The bullet and clots were removed and the cord sutured with three chromicised catgut sutures, which also included the dura, and several others in the dura only. Two years subsequently voluntary motion was practically lost in the lower limbs, but there is some sensation that indicates to him when his bowels or bladder are about to be emptied, and enables him to keep from soiling himself if a vessel is promptly given to him. Bedsores that were present healed promptly and but slight trophic changes occurred.

Dr. William L. Estes,[9] of Bethlehem, Pa., also sutured a completely divided cord, with some restoration of function, but I have not seen a report of the case.

To offset the improvement noted in these cases after suture of the cord, is the case of pistol shot of the cervical spine observed by Pilcher[10] in 1901.

A boy, aged eleven years, was shot with a 22-caliber rifle bullet, the missile entering just below the episternal

notch, ranged upward and backward, and escaping the important structures in the front of the neck, apparently passed through the spine between the fifth and sixth cervical vertebræ. The boy was paralyzed from the clavicles downward both as to motion and sensation, and he had priapism, involuntary urination and defecation, and the usual signs of a transverse lesion. He gradually improved, regained control of the bladder and bowels, and began to have voluntary muscular movements in his limbs. A laminectomy was done after a month's interval, but no injury to the cord was detected. He subsequently regained much of his muscular control, as well as of sensation. An *x*-ray picture taken one year after the injury showed "the bullet embedded in the base of the spinous process of the sixth cervical vertebra." Dr. Pilcher says the ball "must have perforated the cord and lodged in the spine of the sixth cervical vertebra behind."

I have briefly transcribed this case, which, if it has been correctly interpreted, shows that gunshot lesions of the cord are neither invariably fatal nor absolutely beyond the possibility of marked restoration of function.

I am not convinced, however, that this was not a case of concussion, rather than a perforation of the cord.

In conclusion I beg to submit the following propositions:

1. That serious and even fatal lesions of the spinal cord may be produced by concussion, without direct impact.

2. That in gunshot injuries, with a probability of complete severance of the cord, laminectomy should be performed, foreign bodies and clots removed, bleeding arrested, and if the cord has been divided, the separated ends should be approximated with sutures.

3. Care should be exercised not to destroy any nervous fibers or tracts that may still be intact.

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DISCUSSION

Dr. R. E. Fort, of Nashville.—With reference to concussion of the spinal cord producing the symptoms referred to by the essayist, I am not personally familiar with any cases. I am familiar with the cases of Stewart and Fowler, and I must say, notwithstanding the unimpeachable reputation of those gentlemen, I am skeptical about the regeneration of the cord after its complete division. I think the physical conformation of the spinal cord almost inhibits its restoration after division, and when we see, after a few days pressure, as has been noted by Weir and others, extensive degeneration of the cord, not simply after an injury, but pressure, it bears out my position that when we have complete separation of the cord with consequent pressure and destruction, it seems to me the hope of anything being done surgically is very small. I have, however, observed some injuries of the spinal cord, and I believe that with one idea in view, if we could operate on these cases early, if we interfered early, and the earlier the better, therefore saving the time of cord pressure and preventing so much degeneration from taking place, we would be able to accomplish something. One case reported by Weir showed extensive degeneration in forty-eight hours, from simple pressure without injury to the cord. There was no direct solution of continuity of the cord.

The case I have in mind is that of a young man, aged twenty-five years, who was shot in the back with a thirty-two caliber revolver, the bullet entering the abdomen, fracturing the eighth dorsal spinous process, going to the right. In twenty-three hours after the injury I saw him, and at once did a laminectomy, removing the transverse process and the spinous processes of the seventh, eighth, and ninth, and I found a portion of the muscle

that had been supplying the spinous process going to the right of the cord was lost, and after that was found, the other portion, about the third of the muscle, had been lost again in a fracture of the right transverse process of the cord, and, penetrating the dura, was lodged within the substance of the cord, with a good deal of hemorrhage. I found upon opening, a spiculum of the transverse process was penetrating the cord near the bullet or a portion of the bullet. The transverse processes were completely removed—three altogether removed—and it is to be noted in this case of extensive laminectomy the removal of the transverse processes, or a great many of the vertebræ, does no harm, and it is important to do that, for the reason that we want for this complicated procedure a full and clear field for our operative work. In this case, as I have said, a spiculum was taken out, a few clots removed, and this man had complete paralysis from the beginning, both motor and sensory, with priapism, retention of urine, and incontinence of feces. The dura was closed with No. 1, sterile plain catgut, and the patient returned to his home. I am reporting this case especially because I have seen some recoveries, and others in which we have noticed considerable improvement. This man has completely recovered, and is now leading the active life of a railroad contractor. I saw him a few months ago, and he has no evidence of any paralysis whatever. He is to all intents and purposes well, except for the fact that he thinks generally he is a little more neurotic than formerly, or he is more nervous than he was, but outside of that all of his functions have been completely restored, and he is now completely well. It is four years since the operation was done.

Dr. Winslow.—What vertebra, doctor?

Dr. Fort.—The seventh dorsal.

Dr. Winslow.—Was the bullet in the cord?

Dr. Fort.—One-third of it was in the cord.

Dr. Stephen H. Watts, of Charlottesville.—I have been interested in Dr. Winslow's paper, not because I have had any cases of concussion of the cord, but on account of two cases I have had within the last three years of bullet wounds of the spinal cord in the mid-dorsal region. In both cases the patients were admitted with total paralysis, both as regards motion and sensation, and at operation the bullets were found lodged in the cord, which seemed completely divided. In one of the cases pieces of clothing and evidence of infection were found about the bullet, which would seem to indicate that operation should be resorted to in all of these cases. In such cases, if one can do no good, one should guard against doing harm, and be careful not to injure any fibers which are not already divided. Both of these cases made a good operative recovery, but died in five

or six months after leaving the hospital. I have always been skeptical about the power of regeneration of the spinal cord after division of its fibers. Dr. Winslow has not said very much about hematomyelia in these cases, and I would like to ask him whether he does not think most of these cases of concussion of the spinal cord are not really cases of hematomyelia.

Dr. O. H. Elbrecht, of St. Louis.—There is one point in this discussion that has not been brought out. I have been very much interested in this subject, on account of having had recently two cases of gunshot injuries of the cervical spine. In one of them the bullet went in close to the cord and lodged in the atlas, and was attended with symptoms of concussion. I cite this case to compare it to another in the service of a colleague, wherein the bullet went just outside of the cord and produced absolutely no pressure. Symptoms of pressure, however, presented themselves. A laminectomy was performed. There was no hemorrhage nor any spiculum on the cord or dura, but the patient presented exactly the same picture as Dr. Winslow has described. It is a question whether the cord was in any way injured, but to all macroscopic appearances there was no destruction of the cord substance. This patient, a boy, died eight months afterward from ascending nephritis. This is another point which should be noted, because a great many of these cases die from nephritis if they go on for a period of several weeks. I have been impressed with this particular feature, that if we are going to do cystoscopy, we had better do it right away, because if these patients get ascending nephritis you have no chance to affect a cure. The time to do cystoscopy is when you are doing the laminectomy.

I recently removed a bullet from a woman who was shot through the mental process, the bullet having lodged on the dura on the anterior surface of the atlas. I stripped off the esophagus, there being no chance to get at it from the nose, and worked the bullet loose through a tenaculum, got some hemorrhage afterward, and there the depression and *x*-ray pictures showed it to be anterior to the cord. This woman came back after the injury. She had been seen by another doctor after the injury, who told her that the bullet should not be removed, that it was too dangerous, which was good logic at that time, because she had no symptoms of any great consequence, but later she could not open her jaw, and for that reason I advised her to have it removed, promising, however, no results. I am happy to say, after three or four weeks following the removal of the bullet she could put her fingers between the teeth.

Dr. James E. Thompson, of Galveston.—We must accept the physiological fact that the spinal cord is incapable of regeneration. There is no way out of it. Histological research has

proved definitely that new axis cylinders can be only formed from the cells of the neurilemma sheath. Hence it follows, as a logical sequence, that the neurilemma being absent in the spinal cord, regeneration of axis cylinders cannot occur.

The indications for operation can thus be reduced to absolute simplicity. Any injury attended by the immediate onset of paralysis and anesthesia has probably destroyed the conductivity of the cord, and if there is no displacement of the vertebræ or pressure on the cord by spicules of bone, or anything like a bullet or blood clot pressing on the cord, operation can hold out no hope of improving the condition of the portion of cord actually injured. What possible good can we expect from mere exposure of the cord? Will inspection help it to regenerate? Are we not more likely to do harm by the extra risks of sepsis?

If, however, in the course of time sensation and motion reappear in part, and we find evidence of deformity, or pressure, or irritation, then operation may be justified. This logical position cannot be deviated from.

I have removed bullets from the pedicles of the vertebræ in two cases where the primary symptoms at the time of injury were those of a complete transverse lesion. Later on, motion and sensation were restored in part, but both patients showed evidence of descending degeneration in the lateral columns. I never expected to benefit the patients by the operation, because I knew that the mere removal of the bullet could not arrest the degeneration or favor regeneration.

In another case I operated on a child and removed a No. 22 bullet from the dorsal region of the cord, where it lay in contact with the posterior nerve roots inside the dura mater. Here there were clinical symptoms of irritation, *e. g.*, intense pain and contractures, and the operation was perfectly logical and legitimate.

The *x*-ray pictures were so good that in the profile view the shadow of the cord of the dura mater and of the bullet could be accurately distinguished.

Dr. Winslow (closing).—I am thankful to the members who have taken part in this discussion. It seems to me, in the second case I reported there was hematomyelia. As to the first case, I do not know whether there was or not because it occurred a long time ago.

I do not see how we are going to get over some of the facts presented. Here is a case in which the cord was completely divided, the case of Stewart, where subsequent to operation and suture there was a very marked restoration of function. Of course, physiology is one thing, but a fact is another, and it is just possible that a fact may outweigh physiology. I do not know. I do not see how we are going to get over a case of that

kind. I do not see how we are going to get over a case like the one Dr. Fort reported, where the bullet was removed from the spinal cord itself, and the man had absolute restoration of function, with the exception that he feels a little neurotic. A good many people feel that way. In these cases of division and total destruction of the spinal cord I do not think we can do any harm by operating, and let us give them a chance. If the cord is separated, let us bring the parts together, as by so doing we may possibly do some good, and can scarcely do any harm.

FIBROID TUMORS COMPLICATING PREGNANCY, LABOR, AND THE PUERPERIUM

By Joseph Taber Johnson, M.D.
Washington, D. C.

The complication of pregnancy and labor with fibroid tumors and of fibroid tumors with pregnancy and labor are conditions which co-exist more frequently than has heretofore been taught in our text-books.

Fränkel states that one-third of the married women having these tumors have but one child. Kottmann has investigated 400 myomata, and says: "They are more frequent in married women who have not borne children than in any other class of patients."

Pinard states that out of 13,915 women at the Baudeloque clinic, 84 had fibroma. These 84 cases were all primipara over thirty years of age, or secundipara with first labor, ten or twelve years previously. Pinard considers prolonged uterine inactivity to be the real cause of fibroma.

Bonnifield, in a paper read before this Society, states that he has himself seen 8 cases of these complications requiring operations, and had seen many others in his private and consultation practice which required no operation. Six cases were reported in the discussion of his paper requiring operation.

Chadwick reported in the second volume of the *Transactions of the American Gynecological Society*, 9 cases of pregnancy complicated by fibroid tumors, in which placenta prævia co-existed as a supposed result of the interfering

presence of the tumor in 8 cases, and in one case a large growth in the posterior uterine wall prevented delivery and caused the death of the woman from rupture of the uterus.

While we cannot say much in regard to their etiology, fibroid tumors are apparently the chief penalty which married women pay for their practical celibacy or race suicide, as it has been recently called.

This complication acts much like a two-edged sword when we agree with Bonnifield and others that one child sterility and race suicide predispose women to the development of fibroid tumors, and that previously existing fibroid tumors predispose to sterility in one of three ways or by a combination of them all. Submucous and interstitial fibroids cause hypertrophic endometritis and diseases of the uterine appendages, and may displace the cervix so as to interfere greatly with conception, if they do not prevent it altogether.

Notwithstanding all these obstacles to fecundation, pregnancy does actually co-exist with fibroid tumors more frequently than one would suppose probable or even possible.

When pregnancy does occur in a fibroid uterus, the cause of sterility above referred to frequently operates to start up an abortion, which, on account of the probability of hemorrhage, which we may be unable to control, and sepsis, which we may be unable to prevent, creates a situation which is hardly less dangerous than the complication of myomata with full term pregnancy.

The diagnosis of these complications is sometimes easy—often exceedingly difficult and even when suspected well nigh impossible. While we may nearly always determine the presence of these growths, we may often be unable, according to Montgomery, to appreciate the existence of pregnancy.

Small fibroids the size of an orange or fetal head, when situated low down in the uterus, may cause much more trouble and risk to the patient, than large tumors may when attached to the fundus or subperitoneal.

The effects of the complications mentioned in the title of this brief paper may be referred to under three separate heads, to wit:

1. The influence of fibroid tumors on pregnancy.

2. The influence of pregnancy on previously existing fibroid tumors.

3. The influence of fibroid tumors on labor and the puerperium.

As more than 50 per cent. of myomatous women are sterile from this cause alone, we are fortunately called upon to treat only a comparatively small proportion of pregnant women who are suffering from the complicating presence of a fibroid tumor. However, accumulative evidence goes to show this complication to be more frequent than we have heretofore taught.

The influence of previously existing fibroid tumors upon pregnancy may be dogmatically stated as follows:

1. If attached to the fundus or if subperitoneal, little or no trouble need be feared.

2. If interstitial and encroaching upon the uterine cavity, we may expect malposition of the fetus, placenta prævia, interference with uterine contractions, and hemorrhage during labor and abortion.

3. If submucus, abortion, hemorrhage, and sepsis.

4. If located in or about the cervix, they may prevent delivery at full term altogether, or if delivery be accomplished through obstetrical surgery, it is likely to be followed by hemorrhage and sepsis.

5. If intraligamentous or intrapelvic, they may cause all the trouble just stated if they cannot be pushed up out of the way.

6. Small fibroids attached high up with long pedicles may, if they become displaced low down in the pelvis, produce all the "dangers" which tumors do when growing in this position, unless they can be dislodged by digital manipulation.

7. Fibromata have been stated to be a cause of extra-uterine pregnancy, undiscovered, however, until time of rupture and emergency operation.

INFLUENCE OF PREGNANCY ON FIBROID TUMORS

1. It causes their more rapid growth on account of increased vascularity of the uterus.
2. It may cause their impaction in the pelvis and subsequent adhesions.
3. The intraligamentous variety may cause intolerable pain by being crowded against the pelvic tissues and organs, causing necrosis and sloughing, unless relieved by a sudden life-saving operation.
4. Submucous and cervical fibroids may be expelled into the vagina and safely removed.
5. Peritonitis and sepsis may be caused by the necrosis and sloughing of a fibroid whose circulation has been disturbed by pressure inside or outside of the uterus.

THE INFLUENCE OF FIBROID TUMORS ON LABOR

1. If small and high up, or large and of the subperitoneal variety, little or no trouble may be expected from their presence.
2. If situated in the pelvis, both large and small tumors may so interfere with the delivery of the child as to require obstetrical surgery, unless we may be able as labor progresses to push them up out of the way.
3. Cervical fibroids may get in the way of the presenting part and thus make natural delivery impossible, requiring the performance of Cesarean section or hysterectomy to save the life of mother or child.

Fibroids may complicate the puerperal state by provoking hemorrhage from their interference with uterine contrac-

tions, or by sloughing as a result of their compression during labor, and causing sepsis from the absorption of putrid and infectious material.

The "special dangers" of these "complications" have been mentioned for the most part in the discussion of their variety, location, and their unfavorable "influence" on pregnancy, labor, and the puerperium. Mention might also be properly made of the dangers to patients of the various obstetrical and surgical procedures instituted for their relief. These operative methods all have a morbidity and most of them a mortality of their own, but when resorted to on account of the presence of fibroid tumors interfering with delivery, added dangers arise which are peculiar to the situation.

Davis, of Philadelphia, says: "This complication is capable of presenting one of the most troublesome, at times one of the most appalling and dangerous, questions which is likely to demand the most experienced judgment and skill of the obstetrical surgeon."

Not one of the least dangers which the patient has to face is that of unwise interference and "meddlesome midwifery."

The consensus of opinion of the most recent obstetrical authorities, so far as I have been able to ascertain it, seems to be, when there is an absence of any of the possible emergencies in these cases, to let the patient religiously alone, practising watchful and expectant treatment. After our diagnosis is made we should be watchful, and some kind of arrangement should be made for the safest management of these patients compatible with their means and environments.

If they are near the end of pregnancy a good hospital would be the safest place of residence.

The methods of treatment for consideration are:

1. To let the patient alone in the absence of symptoms, not operating simply on account of the presence of a tumor which *may* occasion some or any of the dangers above referred to, especially in the first half of pregnancy.

2. The consideration of the question of emptying the uterus, the decision resting with competent consultants.

3. The removal of tumors likely to interfere with delivery which can be safely reached through the vagina, without invading the uterine cavity.

4. Such obstetrical operations as may be indicated in the course of the labor to be also performed through the vagina; namely, forceps, version, embryotomy, and the combination of outside abdominal and inside vaginal efforts to push up movable tumors out of the way of the presenting part.

5. Abdominal operations as indicated, myomectomy, Cesarean section, the Porro operation, supravaginal hysterectomy.

PRACTICAL APPLICATION OF THE AUTONOMIC NERVE FUNCTION IN THE CONTROL OF PAIN ORIGINATING IN THE ABDOMEN AND PELVIS

By Charles A. L. Reed, A.M., M.D.
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Generalities Relative to the Autonomic Nervous Phenomena

The word "autonomic," as applied to the manifestations of pain of visceral origin, signifies the expression of that pain in some superficial muscle or muscles rather than in the viscus in which it has its initial causation. The phenomena clearly imply the existence and coöperation of three distinct factors, namely:

1. Some more or less profound disturbances, functional or organic, of certain of the viscera.

2. The transmission of a painful impulse, thus originated, over or through what Head has designated as the autonomic nervous system.

3. The registration of that impulse and its expression as pain in the muscle or muscles to which the respective external or peripheral autonomic filaments (muscle nerves) are distributed.

It is through this mechanism and by the coöperation of these factors, according not only to Head,[1] but to Ross[2] and Mackenzie,[3] that the phenomeon of muscular rigidity

[1] Brain, 1893, pt. i, p. 1.
[2] Ibid., 1888, x, 333.
[3] Ibid., 1893, iii, 321.

occurs autonomically, for example, over an inflamed appendix vermiformis or over an impacted gall-bladder, or over the seat of an intussusception.

Through this same mechanism in each of the instances given, and for manifest reasons, the intensity of the pain and of the muscular rigidity are relative each to the other, while both are relative to the intensity of the causative change in the viscera.

The peripheral control of pain thus originating and thus manifesting itself implies either one of two hypotheses. The first is that, if an algetic impulse can be telegraphed, as it were, from viscus to muscle, it would seem possible to telegraph an analgetic impulse back over the same wires, *i. e.*, from muscle to viscus. The second hypothesis is that, if the functions of the external autonomic filaments can be inhibited, the algetic impulse cannot reach the muscles and must consequently fail of expression as pain.

Whether an algetic impulse originates in a given viscus, *per se*, or whether, after transmission through the autonomic nerve filaments, it is expressed exclusively in or through its corresponding muscles, is a theoretical problem, the solution of which is quite apart from my present purpose.

Autonomic and Other Nervous Relations of the Uterus and Adnexa.

The application of these general principles to conditions originating within the pelvis necessarily involves at least a brief consideration of the autonomic relations of the intra-pelvic organs.

I find that the more convenient way to present this subject is to divide the genital organs into three zones, viz:

1. The first or upper genital zone, consisting of the fundus of the uterus, the Fallopian tubes, and the ovaries. To this zone are supplied (*a*) sympathetic branches from the plexus

hypogastricus through the plexus arteriæ ovariaceæ in the broad ligaments; (*b*) sensory branches from the twelfth dorsal and from the first and second lumbar nerves; (*c*) autonomic filaments afferent from the zone indicated to the spinal centres. These filaments occur coincidently with the sympathetic and reach the spinal cord through the communicating branches in the lower dorsal and upper lumbar regions. Their terminal distributions are to the intertransversarii and to the quadratus lumborum and to the two psoas muscles.

2. The second or middle genital zone, consisting of the cervix uteri, to which are supplied (*a*) sympathetic branches from the lower ganglia; (*b*) sensory branches from the second, third, and fourth sacral nerves; (*c*) autonomic filaments efferent from the cervix to the spinal centres through (1) the communicating branches of the sympathetic; (2) the second, third, and fourth sacral, and are distributed to the two gluteii muscles, to the quadratus femoris, the coccygeus, and the levator ani muscles.

3. The third or lower genital zone, consisting of the external genitalia, including the vagina, is not considered in this connection.

The Relation of Autonomic Nervous Phenomena to the Diagnosis of Intrapelvic Conditions

The nervous connections of the uterus and adnexa just given, taken in connection with the autonomic function as outlined by Head, have an obviously important relation to diagnosis. Familiar phenomena of pain have a more definite meaning when interpreted in the light of these facts.

I have been able in this way to associate pain in the costo-iliac interval and in areas representing the distribution of the posterior ramus of the twelfth nervous dorsalis with conditions in the upper genital zone as follows, viz.: (*a*) a small submucous nodule in the fundus of the uterus; (*b*)

adhesions of the fundus uteri in the cul-de-sac of Douglas; (*c*) fixation (hysteropexy) of the fundus uteri to the abdominal wall (an operation never done by myself); (*d*) premenstrual engorgement of the uterus and ovaries; (*e*) cirrhosis with follicular degeneration of the ovaries; (*f*) distention of occluded Fallopian tubes; and (*g*) ectopic pregnancy.

I have likewise been able to demonstrate the relationship of pain in the ileogluteal area, supplied by the posterior rami of the second, third and fourth sacral nerves, with conditions in the middle genital zone, chief among which are the following, viz.: (*a*) painful cicatrix of the cervix, (*b*) cervical erosion, (*c*) intramural myomata of the cervix, and (*d*) cystic Nabothean follicles.

Intrapelvic Conditions Causing Autonomic Manifestations of Pain

From the observations just recorded, and from a general survey of the subject, I am impressed with the probability that, in the majority of instances, more or less definite autonomic manifestations of pain will be found in conditions as follows, viz.: (*a*) In the *uterus:* malformations; certain new growths, both hyperplastic and inflammatory; certain premenstrual congestions; mechanical occlusions; displacements; infections. (*b*) In the *Fallopian tubes:* infections; occlusions with distentions; ectopic pregnancy. (*c*) In the *ovaries:* displacements; pressure from superimposed viscera; infections; tunicæ adventitiæ; adhesions; follicular degenerations; dermoids. (*d*) In the *cervix:* cicatrices; erosions; infections; distortions; neoplasms. (*e*) In *pregnancy,* complicated with neoplasms or neurasthenia, or both. (*f*) In *parturition,* in which, ordinarily, the autonomic manifestations of pain shift from the upper to the lower (superficial autonomic) zones coincidently with the progress of the labor.

The Peripheral Control of Autonomic Pain of Intrapelvic Origin.

If, from what I have already presented, we are to assume that pain originated in the uterus or adnexa is not pain until it is registered in the form of tonic contraction of the autonomically associated muscle or muscles, it would seem that inhibition of the autonomic function of the respective muscle or muscles would inhibit the manifestations of the pain. I have, in fact, successfully reduced this postulate to practice in a sufficient number of instances to convince me of its general tenability. It is accomplished, in brief, by deep anelgetic injections into the substance of the affected muscles themselves. Whether the result depend upon the anelgetic agent or agents used in these injections, or whether they depend upon the water used, or whether both elements are of importance, may well be taken up by the experimental pharmacologist.

I wish here to record, however, that something like forty years ago the late Professor C. G. Comegys, of Cincinnati, successfully inaugurated the practice of treating lumbago by injections of distilled water into the substance of the quadratus lumborum muscle. The practice is yet kept up with uniform success by my colleague, Professor F. W. Langdon,[1] of the University of Cincinnati, with whom, in these cases, *aqua puncture* is a matter of routine in his wards. In later years, following the introduction of cocaine and its congerie of anelgetic agents, and especially since the excellent work of Schleich,[2] some fifteen years ago, there has been a tendency to rely upon the injection of these agents rather than upon the infiltration of water for the inhibition of nervous and muscular irritability.

It would seem, however, that in such conditions as lum-

[1] Personal letter to the author.

[2] "Schmerzlose Operationer," 1895.

bago, as shown by Langdon, and in sciatica, as shown by Lange,[1] Sicard,[2] Hecht,[3] and other neurologists, there is an increasing tendency to recognize the water as the relatively more important anelgetic element of the solution. The three last-named authors are inclined to the use of water in the form of normal salt solution because of its assumed greater ositonicity. Then, too, we must recognize that another and a chief object that they have in using perineural infiltration of large quantities of water in sciatica is mechanically to break up inflammatory connections between the nerve and adjacent structures. Langdon insists, however, that it seems plausible to him "that distilled water would be effective and probably in smaller quantity, since the 'affinity' of the nerve tissues (containing salts) would be greater, perhaps, for pure water"—a consideration which offers a rational explanation of his success in the treatment of lumbago by "aqua puncture." But without going into this aspect of the subject, and without assuming for a moment that either lumbago or sciatica is autonomic in cause or character—although the former may be—both of these conditions present the phenomenon of muscular irritability, and, in that particular, become important criteria for the control of muscular irritability from whatever cause it may occur.

The Role of the Autonomic Nerves in the Treatment of Visceral Pain

It seemed to me,[4] after some study of this question, that if the autonomic nerves conveyed an irritating impulse from affected viscera to the surface, those same nerves might be

[1] Deutsch. med. Wochenschr., Leipsic, 1908, No. 6.

[2] Quoted by Hecht, infra.

[3] Journal American Medical Association, February 6, 1909, xlii, No. 6.

[4] Reed, New York Medical Journal, March 5, 1910.

employed for telegraphing a corrective impulse back from the surface to the affected viscera. In other words, if, as Nothnagel and Lennander[1] insist, visceral pain is really pain manifested chiefly in the phenomenon of muscular hyperalgesia, why would not the inhibition of the muscular hyperalgesia inhibit in turn the visceral pain? Acting on this theory I promptly had an opportunity to put it to test. I had done a gastro-enterostomy to control pain and rigidity—epigastric hyperalgesia—following which I had applied heat to relax the muscles and given morphine with which to benumb the sensorium. Thirty-six hours of this treatment had failed to bring relief, and the patient was crying to be reanesthetized. I thereupon injected into the belly of the rectusabdominis muscles at several points on either side of the incision a solution of cocaine and morphine in the form of a Schleich solution. Within twenty minutes the patient dropped into a comfortable sleep, and from that time on had no recurrence of epigastric hyperalgesia. The pain following hysterectomies, oöphorectomies, and other uncomfortable operations upon the uterus and adnexa have been similarly relieved by deep muscular injections into the hyperalgetic areas. In a number of cases I have had entirely satisfactory results from the use of the cocaine alone, and latterly of novocaine, thus showing that it is sufficient to overcome what I look upon as entirely normal but none the less painful muscular irritability and to do so without hypnotics addressed to the general consciousness. Even in some instances, as in a case of a firm intra-uterine pack following a curettage, in which the superficial hyperalgesias were also present, the inhibition of the muscular irritability within the involved superficial areas was followed also by cessation of the pain referred by the patient to the uterus. From this experience interpreted in the light of the facts which I have presented I arrive at the object that I had in preparing this paper, and that is to emphasize, by brief summary:

[1] Journal American Medical Association, xlix, p. 198, 1907.

The Treatment of Postoperative, Parturient, and Other Pain of Visceral Origin

1. Visceral pain, so far as the abdomen, pelvis, and thorax are concerned, is expressed chiefly, but not exclusively, in the autonomic algetic areas in the protective walls covering the respective viscera, such algetic areas corresponding in extent with the peripheral distribution of the autonomic nerves coincidently with the peripheral distribution of the respective spinal nerves in the muscles and subserous connective tissue.

2. These distributions can generally be determined clinically by determining the area of parietal hyperalgesia.

3. The pain itself, consisting chiefly of hyperexcitation of muscle irritability, can be partially, and, as a rule, entirely, inhibited by inhibiting the muscle sensibility in the hyperalgetic areas.

4. The same principle applies to the peripheral control of pain originating in the parturient uterus, with the difference that the infiltration of succeeding muscle zones must be practised with the corresponding advance of the delivery.

Method of Treatment. My method of treatment, briefly stated, is as follows: (*a*) Have prepared a standard analgetic and local anesthetic mixture, as follows: Novocaine, 0.04 Gm.; morphine hydrochloride, 0.01 Gm.; scopolamine, 0.015 Gm.; normal salt solution, 1. Cc. This represents a single dose which, before administration, is further diluted with normal salt solution to permit of its distribution by numerous deep punctures with an ordinary hypodermic needle into the hyperalgetic areas. (*b*) For analgesia: After thoroughly cleansing the integument, all of the mixture is injected into the muscular layer, several punctures being employed and care being taken to make them at points that approximately define the circumference of the hyperalgetic area. The analgetic effects will be realized within from

five to ten minutes, and, in consequence of the presence of the scopolamine, will be continued often from six to eight hours, while in some instances they will be permanent. (*c*) For local anaesthesia: The same solution is used in the same way, with the exception that it is discharged into the subcutaneous connective tissue at points that approximately define the circumference of the area that it is desired to anesthetize. The sensibility will disappear in from five to eight minutes, and will remain absent for a period varying from an hour to three hours. (*d*) The infiltration treatment practised by Schleisinger, Hecht, and others, in sciatica involves the injection of large volumes of the solution, thus: (1) 10 to 20 Cc. of the normal salt solution reduced to zero C.; (2) 80 to 100 Cc. of normal salt solution at the temperature of the body; (3) 60 to 120 Cc. of beta-eucaine solution at the temperature of the body. Langdon's method of treatment by pure aqueous infiltration involves the use of smaller volumes of fluid.

Disclaimer. Now that I have presented briefly this phrase of the manifestation and control of visceral pain, and in view of the tendency to give a wider scope than is intended to a single idea, I wish, in conclusion, to make a few points very clear. In the first place, the details of the autonomic phenomena are only beginning to be understood. In the next place, while I believe that these phenomena, when once understood, may be classed among the clinical constants, I do not believe that they can have a significance that will justify failure to consider all other diagnostic factors.

And finally, I wish it distinctly understood, that while I recognize the possibility and, under certain obvious circumstances, the desirability of temporary control of pain by the method I have indicated, I do not recognize that it can ever supplant the rational curative method which always implies the removal of the cause for the cure of the effect.

ACUTE MULTIPLE UROGENOUS ABSCESS OF THE KIDNEY RESEMBLING ACUTE UNILATERAL HEMATOGENOUS NEPHRITIS

By George Tully Vaughan, M.D.
Washington, D. C.

G. C., white, male, aged twenty-nine years; nativity, Greece; occupation, waiter; admitted to Emergency Hospital May 7, 1910; referred to me by Dr. Constas. Patient's family history was unimportant, except that it showed no history of tuberculosis, his parents and all his brothers and sisters still living and in good health. Patient claims to have had no disease until he contracted gonorrhea at the age of twenty-three, and failed to make a complete recovery; at the age of twenty-five he had another outbreak of the same disease, which lasted three or four months, and at the age of twenty-seven he had his third attack, which lasted over a year, but from which he thinks he made a good recovery.

His next trouble began suddenly in the night of January 17, 1910, with some pain in the left lumbar region, which extended down into the iliac and inguinal regions, followed by vomiting. He was admitted to the hospital, where a diagnosis of probable stone in the kidney or ureter was made, but the Röntgen-rays failed to confirm the diagnosis. The pain and vomiting continued for several days, then gradually subsided, and after three weeks he left the hospital seemingly well, and had no further trouble until May 7, 1910, when at 2 A.M. he was again attacked with pain and vomit-

ing, as in the attack of nearly four months before, and was admitted to hospital at 4 A.M., May 7. At the time of admission his pulse was 84 and temperature 98.6°. Next morning the pulse was 108, temperature 102°, and at 7 P.M., on the same day, the pulse was 136, and temperature 104.8°.

May 9, had two chills. Pulse, 126; temperature, 104.4°; tongue and lips dry; and he was evidently a very sick man. Urinalysis showed numerous bacilli, some leukocytes and epithelial cells, no albumin or blood. Blood examination showed leukocytes to be 12,800. Pain was not great and was in the left hypochondriac region, which was slightly tender in front and behind over the kidney. Diagnosis was made of a severe acute infection of the kidney or spleen, probably multiple abscesses of the kidney, and immediate operation advised. Under morphine-atropine-ether the left kidney was exposed by an oblique incision just below the last rib which was removed for the purpose of giving more room. The perinephric fat was found thickened and adherent to the kidney, which was much enlarged, and removed with some difficulty by clamping the vessels at the hilum with forceps, cutting the kidney away, and then ligating the pedicle in two sections with chromic gut. The patient's condition was bad, pulse 170, and the operation was hurriedly completed, leaving four pairs of hemostats, which controlled vessels, projecting from the wound.

The temperature and pulse fell gradually after the operation for thirty hours, when the temperature was 98.4°, and pulse 100. The temperature rose to 101.8° on the eleventh, and then subsided to normal, and the patient had an uninterrupted convalescence.

The kidney was enlarged to two or three tines its normal size, weighing 335 grams (about 12 ounces), and was thickly studded with yellowish-white nodules on the surface and in the parenchyma, some of the nodules being grouped together in patches, others scattered generally, and varying in size from that of a pinhead to a pea. It looked exactly

like cases of tuberculous kidneys which I have removed. In the pelvis of the kidney which did not seem to be affected was a round calculus about the size of a .32 ball. Dr. J. J. Kinyoun kindly examined the specimen for me, and the following is his report:

"The capsule is thickened and edematous. Between the capsule and cortex there are numerous small hemorrhages; some contain a considerable number of pus cells and mononuclears.

"The glomeruli are compressed by an edema; in some there are hemorrhages, in others, fibrin and pus cells.

"Many of the convoluted tubules, and some of the straight tubules show an acute parenchymatous degeneration, with desquamation; a number of these contain hemorrhages.

"The hemorrhages and exudate within the tubules appear to have their origin in the pelvis and in an ascending process, and are not due to infective emboli.

"The convoluted tubules in a number of areas are greatly distended with pus cells, fibrin, and cell detritus, so that they have almost completely lost their characteristic morphology.

"Scattered through the kidney are abscesses of various sizes and degree of degeneration. These are more numerous in the cortex, but none of these resemble infarcts. The capillaries and arterioles do not appear to have been involved to any extent in the inflammatory process; some of the vessels in close proximity to the abscess, or implicated therein, contain an increase in the number of leukocytes, principally pus cells.

"A careful search was also made for tubercle bacilli, but none were found. Masses of a short, round-end, Gram-negative bacillus were seen in many of the abscesses. These probably belonged to the colon group.

"No bacterial examination was possible, because the specimen had been placed in a hardening solution for some time before being received for examination."

From this report it is evident that the infection extended from the pelvis of the kidney, which contained a stone, through the uriniferous tubules, into the substance of the kidney.

Previous to Dr. Kinyoun's examination I had regarded the case as one of acute hematogenous nephritis, for which I had been on the lookout ever since I read Brewer's paper on the subject, published four years ago in *Surgery, Gynecology, and Obstetrics,* and heard a second paper on the same subject by the same author two years ago, at a meeting of the American Surgical Association. The later stages or results of kidney infection, such as abscess, pyelitis, pyelonephritis, and pyonephrosis, have long been recognized, but the early symptoms of acute multiple abscess have often escaped recognition.

Kidney infection may be one of three kinds, namely, traumatic, urogenous, or hematogenous. Two factors are necessary in order to get a hematogenous infection—first, the presence of microörganisms in the blood current; and second, a peculiar condition of the tissues of some organ which invites the location of these microörganisms. My case evidently belongs to the urogenous variety of infection, the germs coming directly from the pelvis of the kidney, although it is possible that they may have been brought to the kidney pelvis by the blood current and induced to locate there by reason of lesions produced by the calculus. The organisms which have been found are the bacillus coli communis, the staphyloccocus, the streptococcus, the pneumococcus, and the typhoid bacillus; and these may enter the blood from the intestine, from abscesses, furuncles, carbuncles, or during the course of exanthemata. One kidney is selected rather than the other because of diminished vitality on the part of the kidney as a result of trauma, disease, or anomaly; such as calculus, stricture, or obstruction of the ureter, or the existence of a floating kidney. Both kidneys are sometimes affected.

In order to demonstrate the effect of traumatism in attracting the germs in the blood to a single kidney Brewer made experiments on 16 rabbits and dogs, by bruising a kidney and then injecting a germ culture into the ear vein, both of the principal and the control animal, and concludes as follows:

"A review of these experiments will show that none of the control animals which had received a moderate dose of pathogenic bacteria directly into the circulation, without other injury, developed a surgical lesion of the kidney. Of the 16 animals which, in addition to the inoculation, received an injury to one kidney, 5 showed no lesion, or only hyperemia, and parenchymatous degeneration. Two of these animals died within twenty-four hours of acute septic intoxication. Of the remaining 11, all developed distinct surgical lesions of the kidney. In 8 the lesions were unilateral and limited to the injured kidney. In 3 the lesions were practically equal in extent and in severity. In the other 2 the lesions in the uninjured kidney were mild in character, and undoubtedly would have recovered under favorable conditions.

"The renal lesions produced by these experiments were practically identical with those observed in our clinical cases."

The symptoms seem to be the same in acute multiple abscess of urogenous origin as in the acute hematogenous variety. There may be a history of infection, and the symptoms usually come on sharply and suddenly, with evidence of an overwhelming infection. Often there are one or more chills, followed by fever and a high temperature, 104° to 106°; pulse, 180 to 140, and leukocytosis of 20,000, or thereabouts. More or less pain is present, but it varies in degree, and while the patient usually complains of pain in the region of the kidney, there may be general aches and pains all over. Tenderness is usually present over the kidney, and Brewer regards tenderness in the costovertebral arch

of one side as pathognomonic. The urine usually contains albumin, pus or blood.

The diagnosis must be made from appendicitis, pancreatitis, cholecystitis, hepatitis, splenitis, and perforating ulcer of the stomach or intestine.

TREATMENT. In the fulminating cases, which come on with such severe symptoms, it would seem, from the experience of Brewer and others, that an early nephrectomy is the proper treatment.

Brewer's experience was striking and instructive. His first 5 cases were treated by incision of the kidney and drainage—all 5 died. He then treated a series of 8 cases by early nephrectomy, and all recovered. It must not be understood from this experience that all cases are to be treated by nephrectomy. If the symptoms are not so acute and the toxemia not so overwhelming, incision, stripping off the capsule, and drainage may be sufficient; but the responsibility resting on the medical attendants in such cases is very great.

CONCLUSIONS. 1. Acute multiple abscess of the kidney can arise from urogenous infection.

2. The symptoms are the same as those seen in acute hematogenous nephritis, and the treatment is the same.

DIVERTICULUM OF THE BLADDER WITH EPIDERMAL LINING

By S. J. Mixter, M.D.
Boston, Massachusetts.

In 1908 a woman, aged sixty-four years, was referred to me by Dr. L. C. Kingman, of Providence, R. I., with obstinate cystitis. There was a very foul urine, frequent micturition and apparent inability to completely empty the bladder. I referred her to Dr. Lincoln Davis, of Boston, for cystoscopy. The first attempt was a failure on account of the absolute impossibility of getting the bladder clean enough for observation.

After a week's care by a trained nurse and frequent washings of the bladder, Dr. Davis was able to get a fairly good view of its interior though far from a satisfactory one. No newgrowth, which had been suspected, was to be seen, but in the roof of the distended bladder he was quite sure he could see an opening.

It had been found that after the patient had endeavored to empty the bladder from eight to twelve ounces more residual urine could be drawn by catheter. As washing had produced only slight results and the cystocopy seemed to show an opening to a diverticulum, it was decided to do superpubic cystotomy. The bladder having been thoroughly distended, a median incision was made above the symphysis and the bladder exposed but not opened. Above the incision and extending toward the umbilicus could be felt a rounded mass apparently connected with the bladder.

Dissection upward showed a sac connected with the bladder and extending nearly to the umbilicus as large as a big orange. This was carefully dissected out without opening either it or the bladder, most of the dissection being easy, but it was firmly adherent by fibrous bands at its upper pole.

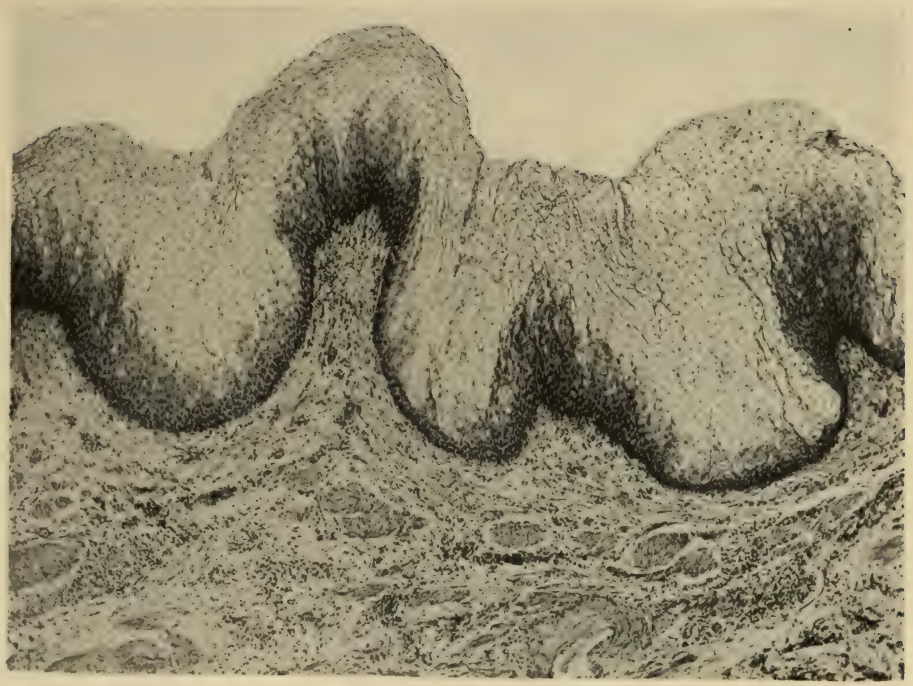
No distinct line of connection could be found between it and the umbilicus. The under part was easily dissected away from the peritoneum and subperitoneal fat and the abdominal cavity was not opened. A narrow neck connected it with the bladder, whose muscular coat was thoroughly exposed about the site of incision. The sac was now cut off close to the bladder and a distinct line of demarcation could be seen between the mucous membrane of the bladder and the lining wall of the diverticulum. The opening between the two cavities was oval in shape; about an inch in its longest diameter. The lining of the diverticulum was white and roughened. The bladder lining appeared practically normal. The opening in the bladder was sutured and the wound healed promptly, the patient making a complete recovery in every way.

In the sac removed were cheesy-like masses of varying sizes, some attached to the wall and still more floating free in fluid with which it was distended.

Dr. Whitney reported that the microscopic examination showed the sac was lined with epidermis and that the cheesy masses were simply clumps of rolled up epidermal cells.

Diverticula of the bladder are common; cysts of the urachus are common and merely patent urachi are still more common, but none of these are lined with epidermis. In this case we had what was practically an enormous wen opening into the bladder.

One meets occasionally with inclusion cysts of this character of the umbilicus, but there is generally a small opening on the surface of the body. Whether this cyst could have started early in life at the umbilicus and finally opened into



Diverticulum of bladder.

the bladder is a question. It is hard to conceive of a true dermoid cyst in this location. Its true etiology I am absolutely unable to give with certainty.

Microscopic Report by Dr. Whitney

The specimen from Mrs. R. E. A. (T. 91-5), January 5, consisted of a rounded cavity the size of an orange, with a thick wall, the inner surface of which was slightly wrinkled, white and cutaneous looking. In one or two places it appeared more like a mucous membrane.

Microscopic examination of the lining of the cavity showed it to be formed of many layers of flat epithelial cells, the deeper layers of which were slightly elongated. At the point where it touched the mucous membrane it stopped very sharply and the epithelium beyond was more columnar and composed of a single layer. In the wall were bundles of smooth muscular fibers.

Diagnosis: Diverticulum of the bladder with an epidermoid lining membrane.

SOME OF THE FACTORS THAT INFLUENCE THE PROGNOSIS IN OPERATIONS FOR CANCER

By G. W. Crile, M.D.
Cleveland, Ohio.

The observations that I shall make are based largely upon a personal experience of 785 operations for cancer upon various parts of the body. The factors that I shall discuss in this paper are:

Type of Tumor.

Age.

Physical State of the Patient.

Location.

Local Characteristics of the Growth that Give a Clue to the Prognosis.

Physiological and Pathological States of the Seat of Cancer.

X-ray and Coley's Toxins.

Time of Operation.

Certain Points in the Operative Technique that Affect the Prognosis.

Immediate Operative Cancer Implantation.

Special Technique.

Type of Tumor. I have seen but one case of melanoma remain free from disease more than three years. This was a case of melanoma arising from a mole on the cheek with metastasis in the neck. The growth was locally excised and a complete block excision of the neck was made. In

melanoma, the slight local growth and the multiple metastases in various tissues and organs indicate the very slight power of resistance the body offers.

Myeloma sometimes appears as a tumor, and thus far has proved uniformly fatal. Primary sarcoma of the lymphatic glands is, in my experience, uniformly fatal; so, too, has been the round-celled sarcoma of the bones. Endothelioma, though strongly tending to metastasize in distant parts, especially in the bones, is occasionally cured, while giant-celled sarcoma, as Bloodgood has shown, is all but benign. In the epithelial group, the basal-celled tumors are least malignant, and the spinal-celled type most malignant. As to the bearing the type of neoplasm exerts upon the prognosis, one observes all gradations between the almost hopeless malanoma and the benign giant-celled sarcoma.

Age. Carcinoma in the young and vigorous is rarely curable, while in lean and dessicated senility its virulence is low. The relative expectancy of life of youth and of senility free from cancer is reversed when both youth and senility are surgically treated for cancer.

Physical State of the Patient. The prognosis in well-nourished, vigorous individuals, or, putting it in another way, the more the patient has of youthful vigor, the less favorable the prognosis. The florid, well-preserved, vigorous, and youthful-appearing subjects present a less favorable prognosis.

Location. The greater the muscular activity of the affected part, the greater the local spread by permeation, and the more likely there will be glandular metastases. As examples, we have the high risk of the tongue and the low risk of the lip; the high risk of the lower rectum as compared with the sigmoid; the pylorus as compared with the cecum. Because of the difficulty of early diagnosis, the visceral cancer presents a far less favorable prognosis than external cancers. The skin cancers, especially of the face in the

aged, are almost all curable. Then again, the relation of the original focus of cancer to the regional lymphatics markedly influence the prognosis. Cancer of the head and the neck, excepting the thyroid, almost without exception, metastasizes in the collar of accessible lymphatics of the neck, while cancer of the breast so frequently metastasizes in the surgically inaccessible parts of the thorax or abdomen. The thyroid sometimes makes distant metastases—especially in bones. Again, cancer of the fundus uteri is less prone to metastases, and more curable than is cancer of the cervix. Of all the cancers excepting those of the skin in old age, there is none, as I believe, so curable as the intrinsic cancer of the larynx. Here the disease, beginning in the vocal cords, is constantly speaking its presence—as it were, it is imploring everyone for help; hence, should always be recognized early; the lymphatic involvement is usually late and always local; the hyaline cartilage is impermeable to the cancer invasion; operation, if early, leaves a useful voice, and but a trifling deformity, and even total laryngectomy presents but slight risk. This is the only cancer of the body that is presented to us in an impermeable accessible box, and whose diagnosis is continually announced to us by its own mechanism within. Would that the abdominal cancers had so beneficent an orator!

Local Characteristics of the Growth that Give a Clue to the Prognosis. The more the neoplasm tends to pile up a wart-like growth and remain local, the more favorable the prognosis; the more the growth permeates its host, and the earlier the metastasis, the less favorable. Then, too, the more the growth permeates its immediate environment, *i. e.*, the cancer with a well-marked border is less dangerous than one whose border extends to an almost insensible boundary.

As illustrations, I have cured no case of cancer of the breast in which the metastasized axillary glands were all small and hard and all were of about the same size, when

even the glands at the very apex of the axilla are as large as the glands nearest the primary focus—all such cases died of thoracic metastases. On the other hand, cases in which the nearest glands were of larger size and but two or three involved, while the apical glands are normal, are rather curable.

As to local permeation, I have never seen cured a single case in which there existed an extended radiated permeation in the skin—whether by small nodules or whether diffusely causing the so-called pig skin. Quite the contrary holds in cases in which the cancer in the course of its growth from within finally involves the skin, but presents a rather definite boundary between healthy and diseased tissue.

Physiological and Pathological States of the Seat of Cancer. Inflammation of the site of cancer, and mechanical disturbance by partial operation, exploration, or by injury or ordinary use of a part, seems to increase the rate of growth. Likewise, pregnancy causes a rapid increase in the rate of growth of a cancer of the uterus. But perhaps the most striking example of acceleration of growth and increase of virulence is in the incidence of cancer of the breast and lactation. I can never forget the striking example of a young mother, aged twenty-four years, handsome, and a perfect example of physical development; while nursing her first born there appeared a lump in her left breast. It grew so rapidly that cancer seemed to be excluded. A frozen section taken under local anesthesia established the diagnosis. Despite immediate radical operation, her downward course was not even temporarily halted. The chest rapidly filled, and she died within four months after the first observation of the tumor.

X-ray and Coley's Toxins. I have used Coley's toxins in a rather large series of sarcomata, the diagnosis of which was controlled microscopically. This latter statement certainly requires a word of explanation. In the light of our present knowledge, I believe we are justified in entertaining

a scientific doubt as to the finality of any microscopic diagnosis of sarcoma, especially in sarcoma of the lymphatic glands and of the tonsils. I need only cite the example of the difference of opinion on the same sections among the pathological experts, and the cautious tone and genuine uncertainty of any first-class pathologist in giving an opinion as to certain types of sarcoma. Especially is one impressed by the influence the history of the case has upon the decision of the pathologist.

My conclusion is that there is at present, at least, despite the prestige of the observer, no such thing as an absolute diagnosis of sarcoma of at least the lymphatic glands and the tonsils. Therefore, a given case of sarcoma cured by any method has outstanding against it this irreducible minimum of doubt against the correctness of the diagnosis.

With this reservation, my experience with Coley's toxins is as follows: I have seen sarcomata of large size shrink to the vanishing point, then grow vigorously again. But in one instance, I observed an inoperable spindle-celled sarcoma of the ilium shrink down to a bony minimum where it has remained quiescent beyond three years. I saw two cases of sarcoma of the tonsil disappear under Coley's toxins —one patient died, six months later, without a return of the growth, and in the other patient no awakening of the growth has, in the subsequent nine months, been observed. Then in cases of cures, judged by the three or more years' standard in which operation, the *x*-ray as well as Coley's toxins were used, it is impossible to estimate the role of each factor.

The value of *x*-rays in superficial skin cancer may be regarded as established, but in these cancers a good prognosis may also be assured by several other methods, especially by excision. In cancer of the eyelid, the *x*-ray is especially indicated. But the *x*-ray does not insure against glandular involvement because the *x*-ray kills only superficial cancer cells. I have in certain cases exposed open wounds immediately after operations, *i. e.*, the patient is,

when possible, taken from the operating room at once to the *x*-ray room and a long seance given. Then on successive days treatments are given until a slight erythema appears; the wound is closed by suturing the skin or by skin grafting. This method, I believe, improves the prognosis.

Time of Operation. This is perhaps the most important single factor—cancers all have a curable stage—*early*. As an example, in my series of 206 operations for breast cancer, those that were operated on while the cancer was clinically still limited to the gland tissue, above 80 per cent. remained well over three years. Early lip cancers by radical operations are nearly all curable—thus early operations everywhere when removed according to good standards are remarkably curative.

Certain Points in the Operative Technique that Affect the Prognosis. I need not mention the importance of a wide inclusive excision—including the regional lymphatics. In cancer of the tongue the glandular involvement of the lymphatics on both sides of the neck, even when the primary focus is unilateral and small, requires a routine bilateral excision of the lymphatic glands in the submaxillary and along the entire jugular chain, not forgetting that all of the upper glands may escape and those as low down as the omohyoid alone be involved. When any cervical gland is involved, the prognosis is greatly improved by a block excision of the entire gland-bearing tissue on that side. In cancer of the stomach there is one objective sign which has in every instance I have thus far observed, indicated a fatal prognosis. I refer to an increased muscular resistance over the site of the growth. In every instance the growth involved the peritoneum, to which there usually is some adhesion. The following explanation of this phenomenon has occurred to me, viz.: pyogenic infection or mechanical injury of the mucosa causes no muscular rigidity, while pyogenic infection or irritation of the peritoneum may cause such rigidity. Therefore, when the cancer reaches

the peritoneum, especially if there are irritating toxins or slight inflammation, the mechanism causing the rigidity of the overlying muscles is adequately stimulated.

Immediate Operative Cancer Implantation. While immediate cancer implantation formerly occurred in many operations, the better technique of the present day limits this implantation principally to the open mucous membrane cancers. Of the mucous membrane cancers thus especially liable to implantation may be mentioned cancer of the lower rectum and anus, of the cervix uteri, and of the mouth. Of all such local implantations, the most striking are seen in the vaginal operation for cancer of the cervix, and the usual operation for cancer of the mouth. The vaginal hysterectomy, without due preperation of the free surface in advance, is quite certain to carry its own defeat. Undoubtedly, if a hysterectomy be made with rough methods, without adequate precautions against immediate implantation, the rich sowing of the fresh wound with cancer cells will result in an earlier cancer death than if no operation at all is performed. There is also sacrificed nature's zone of resistance to the extension of the cancer. Such operations play into the hands of cancer. Likewise an operation for cancer of the mouth, which is early followed by extensive involvement of the entire operative field is evidence of a rich cancer sowing. As it seems to me, one of the most important parts of these operations is that of effective precaution against cancer implantation. To this end, a preliminary cauterization and possibly an *x*-ray exposure of the field, and the deferring of the excision a sufficient time to insure seems important.

Special Technique. In cancer of the stomach in which there is great emaciation and prostration from vomiting, there is a factor that strongly improves the prognosis—that factor refers to the immediate technique. I can perhaps best illustrate this point by referring to its application in a concrete instance. A patient, aged seventy years, bed-

ridden and starved, turned as a sort of last resort to surgical advice. Though unable to sit up in bed, I still felt that it was worth while making an effort by utilizing the remarkable efficiency of direct transfusion of blood, which supplies immediate intravenous food, fills the bloodvessels, raises the blood pressure, and hence increases the efficiency of all of the starved tissue of the body. The donor was a son, and the transfusion was continued as needed during the operation, which was performed under the beneficent nitrous-oxide oxygen anesthesia. At the first seance a simple gastro-enterostomy, using the cobbler stitch, was made; there being no anesthetic after effects, food was immediately given. Ten days later, a resection of approximately two-thirds of the stomach under nitrous-oxide oxygen anesthesia was performed. The patient gained from the beginning, and in three and a half weeks from the time of her first entrance into the hospital, she was transformed from a state of starved somnolence, requiring ambulance transportation to the hospital, into a feeling of well being, and able to walk. Her age, while militating against the immediate operative result, was distinctly favorable as to the ultimate cancer prognosis. It is now nearly three years since her operation, and she is in good health.

Recapitulation. The observations in this paper are based on a personal experience in 785 operations for cancer of various parts of the body. The melanomata, the round-celled sarcomata involving bone and the lymphatics, are rarely cured; the mixed-cell sarcomata are more frequently cured, while the giant-celled sarcomata are almost benign. In sarcoma, Coley's toxins and the *x*-rays are deserving of further trial. The prognosis in sarcoma of the lymphatics and round-celled sarcoma of bones, and melanomata when at all disseminated, is slightly, if at all, improved by operation. In epitheliomata, the basal-celled is least malignant, and the spinal-celled most; when located in muscular organs the prognosis is not so favorable as when in most other

localities. The incidence of pregnancy in cancer of the uterus, and lactation in cancer of the breast, seriously increases the gravity of the prognosis; in glandular metastasis in cancer of the head and neck, if the cancer has broken through the capsule and invaded the deep planes of the neck, operation has little influence upon the prognosis; if the glands are palpable, block excision secures the local prognosis. Of all cancers in important organs, intrinsic cancer of the larynx should be most curable, because it early and constantly vocally calls attention to its presence, has but slight lymphatic connection, and presents itself in a cancer-proof box—a sort of safety deposit box. We possess at present virtually no means of modifying the prognosis in deep esophageal cancer. The most important factor in cancer of the viscera is early diagnosis. In the operation upon open cancers, immediate operative implantation is a strong factor in the prognosis. The post-operative use of the *x*-ray favorably modifies the prognosis. As to the immediate mortality, the newer methods for controlling the circulation and for preventing shock, materially improve the prognosis. That operation most favorably influences the prognosis which takes into account all of our surgical resources, and is performed at the earliest possible moment.

The constantly improving results should inspire renewed hope for cancer patients. Tumors in the cancer period of life should never be watched; they should be surgically dealt with.

OPERATIVE TREATMENT OF DIFFICULT CASES OF PALATE DEFECT AFTER INFANCY

By V. P. Blair, M.D.
St. Louis, Missouri.

With very few exceptions, I believe that all cases of congenital cleft of the palate can be closed by what is commonly termed the von Langenbeck operation, but in some instances certain accessory procedures are advisable and even necessary. In a few cases, usually those in which large parts of the soft tissue have been lost after previous unsuccessful operations, it may be necessary to employ radically different measures.

It is my purpose in the present communication to illustrate certain ways of utilizing this operation in difficult cases after infancy and also to present a plan of dealing with cases that, by most surgeons, have hitherto been regarded as practically inoperable.

The simplest modification of the von Langenbeck operation, and a very useful one, first proposed, I believe, by Julius Wolf, is applicable in cases in which the cleft is of more than moderate width compared to the available soft tissue of the palate and also in cases where these tissues are thin and atrophic. It consists of a two step operation. In the first stage the mucoperiosteal flaps are loosened from the bone through lateral incisions and the velum is detached from the posterior border of the palate process but no incision is made at the cleft borders. The spaces between the flaps and the bone are packed with gauze for a few days,

when the operation is completed in the usual manner. This procedure causes the tissues to stretch and to thicken and increases their blood supply. It is my custom to saturate the packing gauze with a 10 per cent. solution of colloidal silver (Crede) and to stitch it in place. The silver solution seems to be non-irritating and is an efficient antiseptic.

Fig. 1 is of a case of wide cleft in an adult before and after this step and shows the amount gained.

Fig. 2, *A*, *B*, and *C*, are of casts made of this case before the first and after the final operation. The dotted lines show the exact location of the lateral incisions which, where practical, were carried to the outer side of the gums. This patient was forty-odd years of age and the operation was done because she was losing her teeth on account of a pyorrhœa alveolaris, and without a restoration of the palate she would not be able to wear artificial dentures. This case was one of the rare instances in which, though there was a complete palate cleft, the patient learned to enunciate almost perfectly by using the base of the tongue against the posterior wall of the pharynx to produce those sounds that ordinarily require the closure of the nasopharynx by the velum.

Fig. 3, *A* and *B*, are of casts before and after the final closure of a wide cleft in an edenteous mouth by this method. Two previous attempts by the ordinary means had been almost complete failures. The case was that of a tubercular adult, whose home surroundings were such that without teeth she could not get proper nourishment. All the teeth in both jaws had been removed before I first saw her. Fig. 3 *B* shows the final successful result.

Dr. G. V. I. Brown, of Milwaukee, and Prof. Hermann Schroeder, of Berlin, have devised methods of narrowing the cleft in children by means of orthodontic apparatus. Brown recommends this in cases of eighteen months to two years as a substitute for the early Brophy operation, while Schroeder uses it up to nine or ten years.

Fig. 4, *A*, *B*, and *C* illustrate a case of a boy, aged six

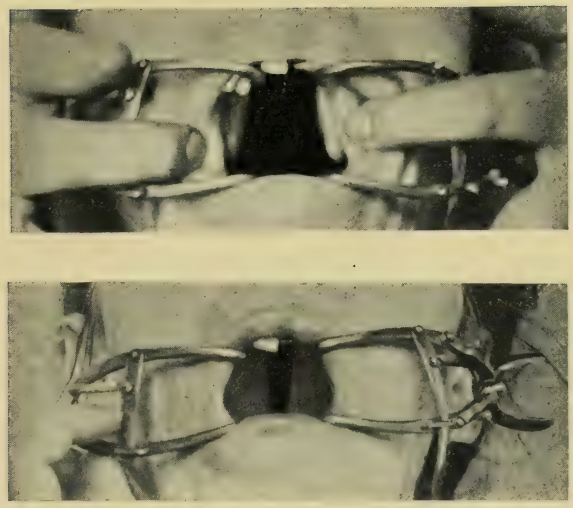


FIG. 1

FIG. 2, A

FIG. 2, B

FIG. 2, C

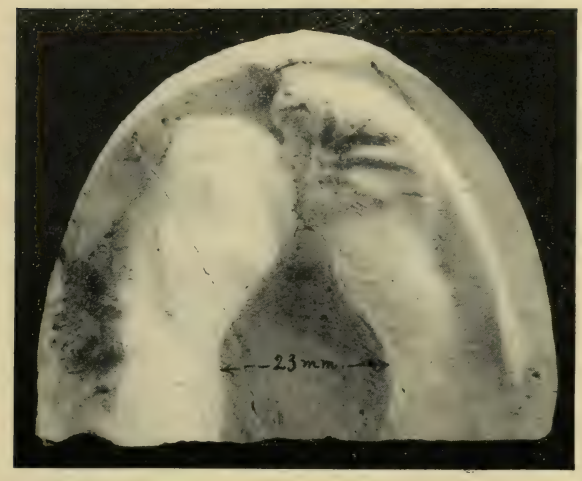


FIG. 3, A

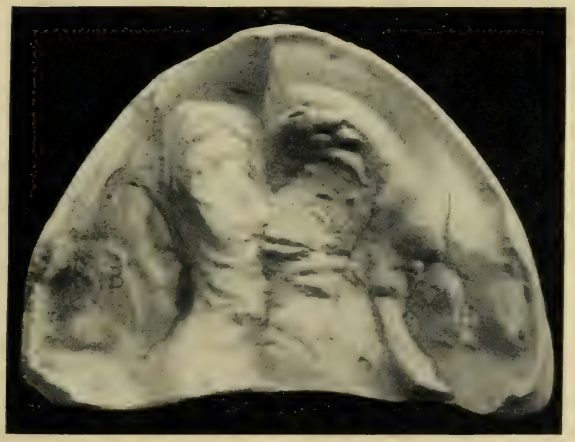


FIG. 3, B

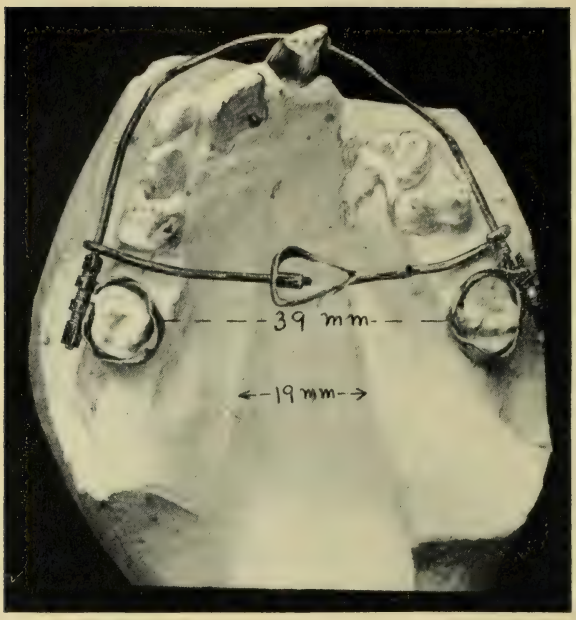


FIG. 4, A

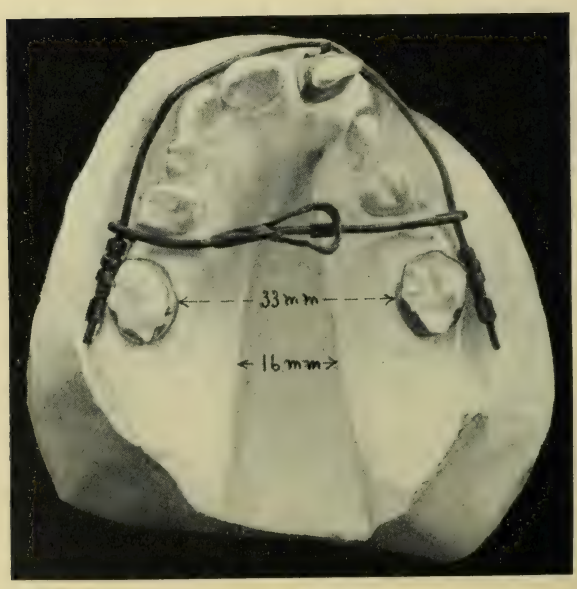


FIG. 4, B

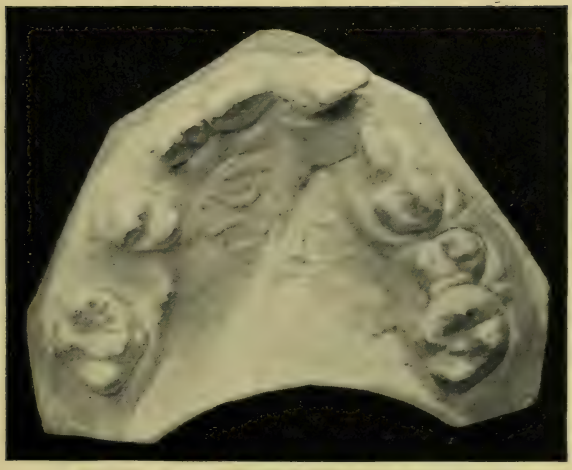


FIG. 4, C

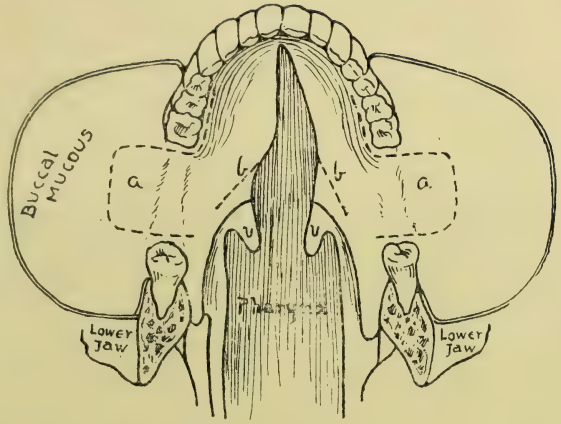


FIG. 5, A

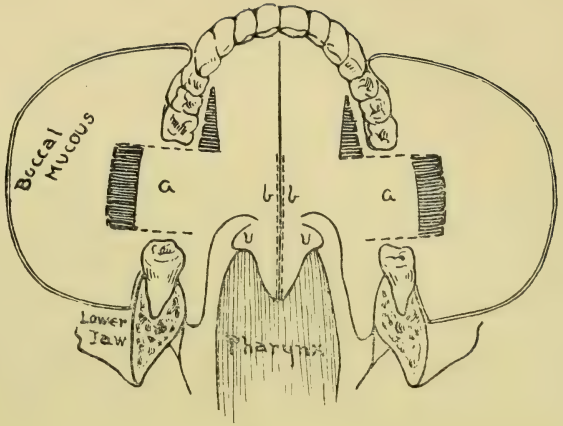


FIG. 5, B

FIG. 5, *A* and *B*.—Kuster proposed the plan, by means of the incisions *b* to *b*, of lengthening the velum, but there is rarely sufficient palate tissue to permit of this being done without leaving such wide gaps at the site of the lateral incision that subsequent scar contraction renders the velum too tense to move freely. The figure shows a modification which obviates the latter difficulty. Cheek flap transferred to velum in operation to lengthen the latter. *A* shows incision at lateral border of hard palate through the muco-periosteum carried behind the maxillary tubercle and straight out on the buccal mucous for one and one-half cm., then backward to the level of the lower jaw and then inward; again cutting the pterygomaxillary ligament. The mucous, pterygomaxillary ligament and buccinator muscle are cut through and the flap is dissected up until the space between the internal pterygoid and tensor palati muscles is opened. The hamular process is cut across at its base. The cleft borders of the velum are not freshened in the usual way, but the incisions *b* to *b* are made on each side through the whole thickness of the soft palate and the flaps behind these incisions are rotated backward. In this way the incisions *b* to *b* are opened and the raw surfaces thus exposed are sutured to each other at the median line (see *B*, Fig. 5). As the two halves of the velum are carried toward the median line the flaps *a* to *a* are drawn inward and there will be no subsequent scar contraction to render the velum tense and comparatively useless. The space between the upper and lower jaw is still covered and opening of the mouth is but slightly interfered with. This operation gives a longer velum than is obtained by the simple von Langenbeck operation and therefore a better functional result. It will not permanently cripple the action of the superior constrictor muscle of the pharynx.

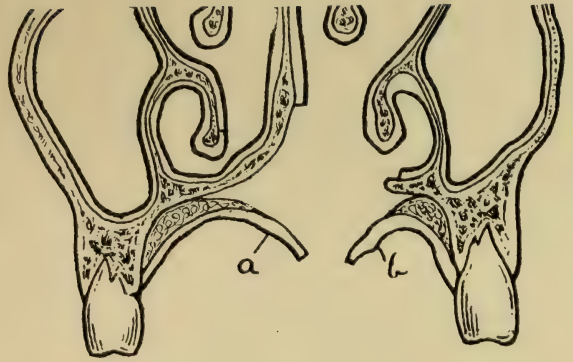


FIG. 6

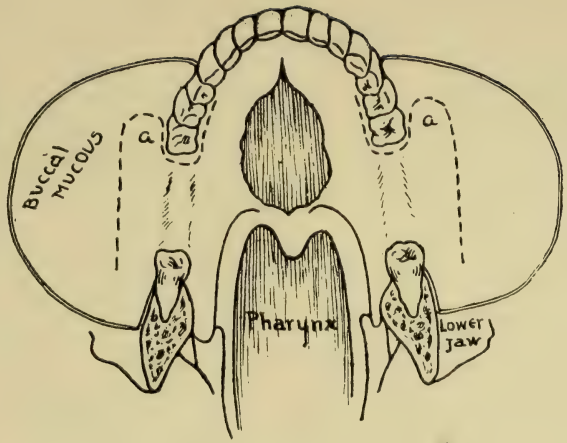


FIG. 7, A

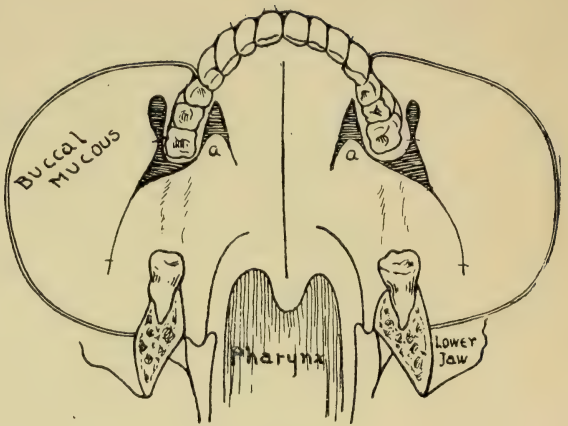


FIG. 7, B

FIG. 7, *A* and *B*.—Transfer of cheek flap for lost tissue. *A*, shows the incision that is made at the side of the hard palate through the muco-periosteum and carried behind the maxillary tubercle, and then skirts the alveolar process forward to the anterior border of the masseter muscle. It is then carried outward in the buccal mucous for one cm. and then backward. It cuts through the mucous membrane, pterygomaxillary ligament, and the buccinator muscle, which structures are raised in a flap as far inward as the tensor palati muscle. The hamular process of the pterygoid process is fractured at its base. As the palate tissues are moved toward the median line the flap is transferred to the palate and the defect in the cheek is partially effaced by two sutures. In taking up this cheek flap the anterior borders of the ramus of the jaw and of the internal pterygoid muscles are exposed and the space between the internal pterygoid and tensor palati muscles is opened by passing into a blunt instrument and pushing the velum toward the median line. *B*, shows the completed operation.

FIG. 8, A

FIG. 8, B

FIG. 9, A

FIG. 9, B

years, with a cleft that was wide in porportion to the available palate tissue. Dr. Le Grand Cox, of St. Louis, constructed the apparatus for me from an expansion arch and in three weeks produced the result shown in Fig. 4, *B*. The amount gained at the posterior part of the palate cleft is shown in numerals, while it will be seen that the projecting intermaxillary process was pulled back into place and the alveolar part of the cleft approximated. Fig. 4, *C* shows the final result, which was obtained without difficulty by the ordinary operation. After removing the clamps, the maxillæ later spring back to near their original positions.

I believe that either of the methods just described will be sufficient to care for any case of simple congenital cleft palate, but one can resort to Küster's method of lengthening the velum with much greater promise of success if some extra tissue is available (see Fig. 5, *A* and *B*), and there still remain those cases in which much or most of the soft tissue covering the palate processes have been lost from ulceration or from operations for the removal of growths or from sloughing after previous attempts to close a congenital cleft, and these can only be repaired by flaps derived from some extrapalatine source.

In a single cleft of the hard palate varying amounts of the mucoperichondrium and mucoperiosteum on the lateral surface of the nasal septum can be included in the broader flap (see Fig. 6, *a*.) In single or double clefts a part of the mucoperiosteal lining of the nasal floor may also be included in the palate flap on the side contiguous to the cleft (see Fig. 6, *b*). In cases of congenital cleft, the loss of portions of the nasal mucous membrane does not seem to cause the disturbance that ordinarily results, at least the patients do not complain of any evil effects. If the posterior border of the velum has been preserved (and this is a part I have never observed to suffer from a postoperative sloughing) the velum and the posterior part of the hard palate can be reconstructed by the procedure illustrated in Fig. 7, *A* and *B*. The velum

is to be detached from the palate process and the cheek incisions must be carried well out on to the buccal surface, otherwise the space just between the jaws will be bared of mucous membrane and scar contraction would soon prevent the separation of the jaws.

The cleft in the hard palate may be restored by a flap turned from the buccal surface of the cheek or from the neck. If there is a harelip the border of the lip cleft makes a convenient base for the pedicle of the buccal flap. In a child a fairly extensive flap may be taken from the inner surface of the cheek without causing any inconvenience or deformity. This flap should include enough submucous tissue to insure the blood supply. If made from the neck the platysmamyoides muscle should be included.

Fig. 8, *B* shows restoration in a young man after extensive postoperative sloughing.

Fig. 8, *A* shows condition after a second failure following attempts to close the cleft by the von Langenbeck operation.

In this case a flap two inches wide was dissected from the side of the neck and upper part of the chest, with its base attached to the lower border of the cheek. It included skin, superficial fascia, and platysma muscle. It is necessary in planning such flaps to procure skin that will not grow hair. An incision was made in the bottom of the buccal alveolar cul-de-sac on that side and the flap was drawn into the mouth and stitched into the defect, the edges having been freshened. The defect in the neck was immediately repaired by undermining the superficial tissues of the neck and suturing. Ten days later the pedicle of the flap was cut and the upper end of the neck defect repaired. Until the pedicle of the flap from the neck is cut the jaws must be held apart by some sort of an intraoral gag or splint. Such a contrivance is shown in Fig. 9, *A*, and was made for the case by Dr. Ruckstuhl of this city. The palate flap is also shown. The condition of the neck after removal of the flap is shown in Fig. 9, *B*. Owing to the abundance of tissue obtained this

gives a longer velum and a better functional result than is ordinarily obtained in adults by the von Langenbeck operation. It leaves but a linear scar to show where the tissue has been removed from the neck. In a number of cases where I have resorted to skin flaps from the neck, for the repair of mouth and palate defects, no inconvenience has been observed as the result of transplanting skin into the mouth. It soon takes on an appearance closely resembling normal mucous membrane.

In one case I successfully resorted to this method in restoring part of the velum, the fauces of one side and part of the oral pharynx, after an excision for a malignant growth.

The idea of repairing palate and other intraoral defects with epithelial tissue from other sources is not new; Blasius, Thiersch, Rotter, and other surgeons having reported such cases.

SYMPTOMS SIMULATING CHRONIC APPENDICITIS DUE TO UNDUE MOBILITY OF THE CECUM

By John G. Clark, M.D.
Philadelphia.

The prospects are encouraging for the further solution of some phases of intestinal auto-intoxication through the analytical study of the gastro-intestinal segmental areas involved under the general headings of viceroptosis. The greatest difficulty encountered in this problem lies in the close interlocking of actual organic and purely neurotic symptoms. Every surgeon has learned to be most wary in his operative advice in neurotic individuals, for he has been taught by experience that the results, unless there is a very demonstrable lesion, are worse than negative, for operations without clear-cut indications are pathologically retroactive in these cases, and are likely to intensify or bring into play even more active nervous disturbances. The hall marks of neurosis are, therefore, such impressive danger signs as to cause one possibly to discard plainly evident organic symptoms in his fear of doing an unjustifiable operation.

In the study of visceroptosis there is usually a considerable or even an excessive neurasthenia, and the severity of these manifestations does not always bear a very evident relationship to the magnitude of the lesion. Thus, one may encounter an exaggerated sagging of the colon and stomach in the course of an abdominal operation for some other lesion, and

yet there may scarcely be no functional defect; in another case of perhaps much lesser degree there are insistent complaints from tympanites, more or less colicky pain, constipation, headache, etc. The discrepancy is more apparent than real, for, as the study of Glenard's disease has been broken up into segmental differentiation, a sharp division may often be noted between those cases in which the stomach is at fault and those in which the colon chiefly participates. While ptosis of the entire colon with dropped flexures may be regarded as a decided anatomical deviation, it may, nevertheless, functionate almost or quite naturally. In one class of cases there may be a general atony of the intestinal coats from chronic fecal stasia, while in another only one part of the colon is affected.

As we have already repeated in other articles, the anatomical rule cannot be invoked in determining a line of treatment. Accuracy in treating mobility deficiencies depends, therefore, upon the conclusion as to whether a part or whole of the bowel is affected, and whether there is sufficient kinking at any point to constitute a hindrance to peristalsis. The best physicians now refuse to accept the word constipation as of great symptomatic value unless traced to its source, for this word as usually employed is as vague as was dropsy in former and gastric reflexes of recent years.

As a symptom it may arise from general colonic atony or as frequently it may indicate only a segmental anomaly.

For instance, a sigmoid flexure of undue length which cannot be accommodated in its usual situation, as a rule gives rise to varying degrees of constipation, from that easily relieved by mild laxative to one so severe as to constitute a type of chronic obstipation, finally culminating in a very serious obstructive attack.

The transverse loop may follow the same course in its functional sluggishness.

Very recently, the anomalies of the cecum have been specially considered in this light. The success of appendiceal

operations have been so brilliant in past years as to centre, surgically, attention upon the vermiform process as the cecal scapegoat. It has been only through failure to relieve patients by removal of the appendix in some cases when the symptoms pointed with apparent accuracy to that organ that anatomical variations in the cecum have been analyzed in the hope of explaining these fecal symptoms. In its function the cecum acts as a second stomach, serving as a receptacle for foods undergoing final digestion. After the food enters this pouch, it is detained according to Cannon, between this reservoir and the hepatic flexure, churning back and forth through peri- and antiperistalsis for at least eight hours, and then gradually is passed over into the transverse segment. If the cecum is normal in size and situation, no indication of this action is subjectively evident; if, on the other hand, there is an unduly mobile cecum, it may be accompanied by characteristic symptoms analogous to those arising from a dilated stomach. Certainly no organ shows such wide diversity in morphology in various types of mammalia as the cecum. Thus, in horses and cattle it is of enormous size, in man it is relatively of much less capacity, and in birds it is a very short tube. If from no other than the evolutionary standpoint, there should be retrogressive types of unduly large capacity. It is, however, not necessary to fall back upon this explanatory hypothesis, for in the development of the cecum wide variation in size and situation are noted.

Wilms first called attention to the fact that symptoms arising from undue mobility of the cecum may closely simulate those of chronic appendicitis. All of us have found to our chagrin that symptoms which pointed apparently with great accuracy to the appendix as the seat of trouble could not justly be traced to the gross or microscopic findings, and further, that while some of these cases are relieved, in many the symptoms persist. In the latter event the pain is usually ascribed to adhesions, and yet in several instances

in my experience, in which a second operation has been performed, because of persistent distress, this sequel has not been present. In such cases we are prone to fall back upon the neurotic basis to account for these failures. Neurologists are frequently inclined to attribute fixed pain in some localities to hysteria; on the other hand, the surgeon does not so readily admit this hypothesis, for in his experience he has seen so many ancient reflexes, and neuralgic pains reduced to an organic and remedial basis, that he is prone to view this doctrine askance.

Wilms, in 1908, through an analysis of a considerable series of appendectomies in seeking an explanation for the persistence of symptoms in certain cases after operation in which relief has been anticipated, looked to anomalies in the cecum as a cause. From this study he concluded that errors in diagnosis and failures to cure emanated from a failure to take into account the disturbances which might arise from a large, unduly mobile or displaced cecum, and suggested an operation to overcome this condition.

It consists in the formation of a peritoneal flap lifted from the posterior abdominal wall, lateral to and so applied to the cecum as to retain it in a normal position. Since his first publication a considerable number of cases have been operated upon, and in the September issue of the *Zeitschrift für Chirurgie,* 1910, Steirlin reports 61 cases from Wilms' Clinic. Of these, 25 per cent. were men and 75 per cent. women, a relative ratio which closely approaches that observed in various other ptoses in the two sexes. Another observation which corroborates the hypothesis of my associate, Dr. Floyd Keene, who ascribes the majority of ptoses to a primary embryonical deviation with developmental exaggeration arising from perverted function, is that these cases were usually young individuals, for 67 per cent. occurred between fifteen and twenty-five years of age. In other words, the potential factor was present at birth, and as soon as an increasing constipation caused a further exaggeration

of the anomaly, more acute manifestations were precipitated. Steirlin summarizes the symptoms in these cases as follows:

1. Recurring colicky attacks in the region of the cecum and ascending colon without rise of temperature, associated with more or less constant dull pain in this same area. In 87 per cent. of Wilms' cases colicky attacks were noted.

2. Chronic constipation, occasionally with recurring diarrhea. In 77 per cent. of his cases constipation was present.

3. In the cecal region ballooning out of the intestine, forming a doughy, movable tumor or a tympanitic bulging with a crepitant feeling significant of gaseous distention. The diagnosis is established by the *x*-rays, which shows fecal *detention in the cecum,* in conjunction with the foregoing symptoms.

As a summary of operative results he reports 75 per cent. relief, 16 per cent. improvement, and 9 per cent. failure.

He ascribes the pain to atony and overdistention of the cecal walls, with stretching of peritoneal nerve endings; to painful peri- and antiperistalsis between the cecum and the hepatic flexures, and to dragging upon the mesentery.

In the course of our study of cases of coloptosis at the University Hospital, several such cases have been noted, but our attention has not been especially drawn to the possibility of localized pains emanating from this particular segmented variety of displacements until the appearance of Wilms' article.

In the light of our experience we cannot avoid the conclusion that Wilms and Steirlin have overlooked a weighty cause of colicky attacks arising from kinking of the ileum at the ileocecal valve, and we are therefore inclined to ascribe his cures more to the elimination of this factor through the elevation of the cecum than to the explanation which he gives. This subject is novel and deserves careful consideration, for these cases belong to our floating population of surgical derelicts, and if we can institute this salvage opera-

tion in these otherwise chronic cases, it is well worth a trial. Certainly little harm can come from the attempt. While I am theoretically inclined to accept Wilms' theories, my experience as yet with his operation does not justify my offering any conclusion as to the results, although I believe we are justified in employing some type of operation in properly selected cases.

THE GALL-BLADDER AND BILIARY TRACT AN AVAILABLE THERAPEUTIC ROUTE TO THE UPPER BOWEL

REMARKS ON THE MC ARTHUR "DRIP," AND ON "CHOLECYSTODUODENAL CATHETERIZATION"

By Rudolph Matas, M.D.
New Orleans, Louisiana.

Every reasonable suggestion that will aid the surgeon in extricating his patient from the many perils and pitfalls which beset the thorny path to recovery, after a critical operation, is worthy of attentive consideration. The last decade has been especially prolific in new methods, procedures, and inventions that have enormously improved our postoperative results, especially when preëxisting injury or disease has crippled the vital resources of the patient long before surgery is appealed to to rescue the struggling victim.

Because of the greater frequency of the indications for operation, the diseases or injuries of the organs contained in the abdominal cavity have offered the most striking example of the increasing resources which have been placed at the disposal of the surgeon in dealing with postoperative complications. It would be profitless to review, or even mention, these revolutionary contributions to the after-treatment of operative cases, as they have now become common property and are too familiar to every practical

surgeon to justify an encroachment on the limited space at my command on this occasion.

THE MCARTHUR DRIP. My purpose today is to engage your attention in a brief review of a procedure which has been too recently suggested to be generally known or appreciated, and which, in my limited but fruitful experience, deserves to be classed among the life-saving measures in the great emergencies which are likely to occur in a particularly dangerous group of biliary infections. I refer to the recent suggestion offered by Dr. L. L. McArthur, of Chicago, at the Atlantic City meeting of the American Medical Association, held in June, 1909, and which appeared in the transactions of the Surgical Section under the modest title, "Some Therapeutic Possibilities of Biliary Fistulæ."

In this very valuable contribution McArthur not only proposed, but demonstrated by experience, the practicability of utilizing the gall-bladder and biliary tract as an indirect route to the duodenum and upper bowel, thus permitting the operator to furnish an abundant supply of water, medicated or nutrient fluids, to the organism at the most critical period of the struggle, when the mere drainage of septic or toxic products from the liver is insufficient to relieve the strain imposed upon the eliminating organs by the general toxemia.

In explaining the purpose, advantages, and technique of McArthur's procedure, I can do no better than quote the language of the author (TRANSACTIONS, p. 223 et seq.):

"In practically every case of operation for gallstones the operator establishes a temporary biliary fistula, either of the gall-bladder or of the common duct, the purpose being to relieve the cholemia, cholecystitis, or cholangitis, by continuous drainage, in much the same way that a urinary cystitis is relieved. Such treatment has proved to be the most efficient yet devised. To hasten the cure, some have added to this simple drainage a daily lavage of the gall-bladder with an alkaline, mildly antiseptic solution. The

loss of much of the fluid used for an irrigation, frequently observed during such a lavage, naturally suggested the idea of studying the effects of various fluids introduced into the duodenum. So striking have some of these been, that I desire to call attention to them, as well as to urge their further study by surgeons. First, as a means of deluging the system with water, the temporary fistula can be utilized with surprising advantage. I have repeatedly injected such cases by a continuous irrigation of a warm sterile normal salt solution, 500, 1000, 3000 c.c. of fluid, first, as an experimental observation, then as a means of flushing out the kidneys, or clearing up jaundice, or filling up the blood-vessels, and, in one case, even added dextrose as supplying the food calories most easily assimilable.

"*Technique.* In every gall-bladder drainage a tube is inserted and is held in place by absorbable purse-string sutures, the latter inverting the gall-bladder wall in such a a way that when the tube is withdrawn peritoneal surfaces come in contact and the fistula heals. These purse-string sutures make the closure of the gall-bladder around the drain practically hermetic for the first few days. To provide, however, against accidental leakage into the abdomen, some temporary protective drain, such as Bullitt, of Louisville, devised, is employed for added safety. If now, with such a tube, through which the bile has been flowing, thus demonstrating the duct as patulous, we connect the tube of an irrigator containing, for example, normal salt solution, the rate of flow being graduated not to exceed five to six drops to a second, and the pressure to be not more than 20 inches elevation, continuous flow into the duodenum can be established and maintained without discomfort to the patient. Too rapid flow, or too high pressure, will quickly produce pain, simulating mild biliary colic, and might deter one from using this procedure if not cognizant of these facts.

"When large quantities of fluids have been thus introduced there has been observed a slowing of the pulse with a

filling out of the vessels, a loss of thirst, a moistening of the tongue and skin, a surpirsingly rapid increase in the urinary output (patients complaining of the frequency of the urination), and even edema of the feet in a patient lying on an inclined bed.

"In case of the gall-bladder drainage the patulous condition of the cystic duct can be determined after the insertion of the drainage tube before closure of the abdomen, by the use of a small glass syringe filled with sterile salt solution. When I have had to utilize common duct drainage, I have never tried this procedure until the second or third day, by which time, if leakage occur, it finds itself confined to the space walled off by the prophylactic gauze inserted for such emergency, and escapes externally."

Indications. The indications for the cholecystoduodenal drip, if we might so designate McArthur's procedure, are obvious in many cases, and will suggest themselves spo - taneously to the mind of the experienced surgeon. As shown by McArthur, it is especially indicated in the cases of chronic obstructive jaundice associated with nephritis, probably incident to the toxic effects of cholemia. "In just such conditions, especially after an ether anesthesia (which, by the way, should now be always discarded for a gas and oxygen combination), there is constant danger of urinary suppression. Under these conditions I have sometimes found it possible to start promptly an active secretion of urine, thus minimizing the patient's danger." Postoperative anuria ending in fatal coma is a well known danger in chronic obstructive jaundice. The frequent association of parenchymatous degeneration of the kidneys with chronic hepatic disease was long ago pointed out by Frerichs and, since his day, by von Leyden, Nothnagel, Moebius, Chauffard, Hanot, and many others. The gravity and pathology of the hepatogenic anuria as a postoperative complication has been well shown by Clairmont and von Haberer in a

recent essay, which is well worthy of consultation by all those interested in the subject.

It was the result obtained in just such a case (to be detailed subsequently) in which the suppressed urinary function was promptly restored and life saved by the timely application of McArthur's procedure, modified by the direct infusion of fluids through a catheter introduced into the duodenum via the gall-bladder and common duct, that made me a convinced believer in the practical value and in the far-reaching possibilities of the upper duodenal route.

Apart from renal complications, chronic jaundice caused by any form of biliary obstruction will be dissipated and relieved more promptly by a cholecystoduodenal drip than when simple drainage alone is used. Moreover, I believe, with McArthur, that persistent postoperative biliary vomiting is more quickly controlled by flushing the duodenum with an alkaline salt solution (Vichy water in my case) than by any other method.

The effect of duodenal infusion in arresting the incessant and exhausting postoperative vomiting was most noticeable in my first case, in which this was one of the most distressing symptoms. I can account for its prompt action only by the supposition that the introduction of fluid into the duodenum and upper bowel in a steady stream starts an active peristaltic wave downward toward the jejunum, which tends to keep the stomach empty and free from bile and pancreatic secretion. Sometimes the fluid appears in the vomitus, thus washing out the stomach, but by the method of direct infusion with a catheter in the duodenum, which I have practised, as will be explained later, the tendency of the fluid is always to flow downward rather than upward.

The most noticeable effect, however, is the stimulation of renal secretion and the great increase in the urinary output which follows after the irrigation has begun. The steady flow of fluid into the upper bowel increases the

fluidity of the intestinal contents, washing the bowel and favoring peristalsis with the expulsion of gases, which are an especially annoying feature in old jaundice subjects. The filling of the bloodvessels and increased blood pressure is certainly a prompt and most gratifying feature of the procedure in exhausted and debilitated subjects.

The method again can be utilized to great advantage in introducing nauseating medicated solutions, as in hemorrhagic cases in which gelatin and the calcium salts are indicated. This is especially true when the oral and rectal avenues for their introduction are barred by vomiting or rectal irritability. Again, my experience tallies with that of McArthur in the value of the cholecystoduodenal route as an effective avenue for the administration of soluble food and nutrient fluids of all kinds.

Direct Duodenal Infusion, or Enteroclysis through a Catheter Inserted into the Duodenum via the Gall-bladder and Common Duct (Cholecystoduodenal Catheterization). It is quite evident that there are cases and conditions which make it difficult or impossible to instil or infuse fluids into the duodenum by the simple "drip" method of McArthur, and that in order to reach its destination in the intestine, a catheter or drain of some kind is necessary to carry the fluid either into the common duct or into the intestine beyond the papilla of Vater.

This is true of all cases in which the cystic or common ducts are obstructed. The discharge of bile through the fistula in the gall-bladder is sufficient evidence, as a rule, that the cystic duct is pervious, and in all such cases the simple drip method of McArthur is applicable; but when the cystic and common ducts are obstructed by gallstones, strictures, inflammatory or neoplastic infiltrations, etc., then the operation cannot be terminated successfully unless the obstruction is removed and the bile current is reëstablished in its normal channels, or by establishing new avenues for the escape of the retained secretions. With the exception

of the procedure of cholecysto-enterostomy, all cases of obstruction of the cysticus or choledochus require drainage; and when this is the case a form of permanent catheterization "à demeure," as the French term it, of the biliary tracts is established, through which the duodenal infusion may be readily administered if required by the postoperative developments of the case. In patients requiring cholecystectomy with choledochus drainage, duodenal infusion may be resorted to if a T-tube of soft rubber is used as a drain, with the tube held in place by catgut suture to prevent leakage. In cases in which the obstruction exists at the cystic duct after opening and emptying it, it will suffice to split its inferior wall through the stricture, dividing the cystic duct to the choledochus (Delagenière's procedure). It is then easy to introduce a soft rubber catheter of appropriate size into the common duct directed toward the duodenum. The remnants of the cystic duct and gall-bladder are utilized as a sheath, which is sutured over the catheter, in this way effectively preventing the leakage of bile and of other fluids should infusion be required. In all obstructive cases showing white clay stools, it is important, after the removal of calculi or other apparent obstructions, to test the permeability not only of the cystic and common ducts, but also of the papilla of Vater, in order to make sure that the normal bile current will be certainly restored. In these cases a soft rubber Nélaton catheter or a flexible lead probe, or a whalebone guide, or, better perhaps than all, a ureteral catheter, should be used as a probe which should go through the papilla of Vater freely. If there is a marked tendency to contraction of the duodenal orifice of the duct, the catheter should remain in the choledochus projecting freely into the intestine. A direct continuity of the tubular tract is thus established from the external wound or fistula in the gall-bladder into the duodenum. When the duodenal opening is free and patulous, the drain or catheter may be left in the duct only, in the usual way, the tip of the catheter

being directed toward the duodenum and not toward the hepaticus or liver. While these directions may be at variance with the practice of other surgeons, I fail to see any advantage in common duct drainage in pointing the catheter in the direction of the hepaticus instead of the duodenum as long as the gall-bladder or cystic duct remains *in situ*. When the gall-bladder must be sacrificed, it is then easy to understand that the "fish-tail" tube of the Mayo's or the T-tube of Kehr, properly anchored in the common duct, will more securely serve the purpose of drainage than an ordinary catheter drain.

It is understood that not every case of obstructive jaundice calls for duodenal infusion; probably the great majority of cases do not; but I contend that in all the more chronic toxic or septic cases the operator should bear in mind the great value of duodenal infusion and adapt his method of biliary drainage in such way that the drain can be utilized for infusion if the indications for its application should arise in the after-treatment.

The catheterization of the biliary tracts for the purpose of supplying water or other fluids to the organism in a great toxic crisis is a new procedure; but as a purely technical performance, it is an old expedient which was far more familiar to the surgeons of the older generation and to the pioneers in hepatic surgery than it is to the better-trained and bolder men of the present day.

Historical Data. For this reason it may be instructive to dwell for a few moments on the history of this almost forgotten and obsolete procedure. As defined in the older texts, the catheterization of the biliary passages is a term applied to any procedure which aims at the exploration of the bile tracts with either hollow or solid sounds (bougies or catheters). In order to enter into the terms of this definition, the exploring instrument must penetrate by the anatomical routes of the bile current, either through the gall-bladder via the cystic or common duct to the duodenum (retrograde

catheterization), or through the duodenum via the papilla of Vater and common duct to the gall-bladder (direct duodenal catheterization, also known as McBurney's procedure). According to the conscientious bibliographic researches of Terrier and Dally, the first record of a successful catheterization of the biliary passages goes back to 1743, when Jean Louis Petit, the famous secretary of the Société de Chirurgie de Paris, published the observations of his unique case. Petit advocated the exploration of the gall-bladder for calculi by sounding with bougies or probes which would reveal their presence. He opposed the method of simple tapping of the gall-bladder, when this was distended and adherent to the abdominal wall, as was the custom in those days. He believed that the gall-bladder should be treated like the urinary bladder, and the exploration and removal of biliary calculi should be conducted on the same principles that guided the surgeon in removing urinary concretions. He recommended the operation of "cholecystendesis," or incision of the gall-bladder, instead of the trocar puncture. In a case of spontaneously formed fistula of the gall-bladder, Petit enlarged the fistulous opening in the skin and introduced a curved sound, which penetrated so deeply that he was confident it had passed the cystic duct and into the choledochus. He was not able to reach the duodenum because the patient could not tolerate the pain of instrumentation. After this primitive and abortive effort, which was aimed solely at clearing of the gall-bladder and ducts from obstructing calculi, nothing was written on this subject from 1743 to 1885, when Charles T. Parkes, of Chicago, reported the second observation of catheterization (July, 1885), in which he cured a chronic fistula of the gall-bladder by cutting down into this organ, removing a mass of calculus, and then introducing a steel sound No. 11, which penetrated all the way into the duodenum. This appeared to dilate the cystic and the common ducts and the fistula closed.

Other observations and essays on the subject of catheterization of the biliary passages soon followed, prominent among which are those of Rose and Meredith (1884), Willet (1886), Kappeler and Ohage and Zagorski (1887), Winiwarter, Torrance, Kroenlein, Courvoisier (1888), Gersuny (1889), Fontan (1889), Faure (1889), and others who gave special emphasis to the systematic and methodical exploration of the bile passages. Probably the most notable and thorough essays on the instrumental exploration of the biliary passages were the contributions of E. Rose (1890) and, above all, the masterly and comprehensive monograph which reviews all the previous publications by Terrier and Dally which appeared in the *Revue de Chirurgie* of 1891–1892. Shortly after these important contributions we may note, among others, the observations of Calot (1890), H. Delagenière, of Mans, and of Fontan (1891), Morris (London, 1895), and especially of Charles McBurney, who is credited with the first catheterization of the common duct by the transduodenal or normal route. In latter years the catheterization of the biliary tracts has been made the subject of systematic discussion in the larger monographs and treatises on hepatic surgery which have appeared in Europe, such as Langenbuch (1894), Pantaloni and Marcel Baudoin (1899), Körte (1909), Faure and Labey (1910). In these and other works the reader will find illuminating information on a subject which, in spite of the first interest which attached to it, in the pioneer days of hepatic surgery, has become, at the present time, almost historical and of comparatively little practical interest. It is only now, that the suggestion offered by McArthur has invested what was an almost obsolete technical procedure with an entirely new interest, that the subject justifies a revival in a greatly modified light.

The object usually sought by the operator in exploring the biliary passages by sounding or catheterizing them was to cure persistent biliary fistulæ after operations for gallstones, or for the drainage of the bile tracts. These fistulæ

remaining in consequence of defective technique (*i. e.*, suturing the mucosa of the gall-bladder to the skin) or because of obstructions in the cystic and common ducts by impacted stones, strictures, inflammatory swellings, and neoplasms, which impeded the restoration of the flow of bile and of the secretions in the normal channel.

Sounds and catheters may thus be used for (*a*) exploratory, and (*b*) for therapeutic purposes. The results obtained by these procedures may be summed up into: (1) Exploration and dilatation of the ducts for the extraction of calculi. (2) Systematic dilatation for stricture. (3) Dilatation with fluids and air (Weller van Hook) for purely diagnostic purposes. (4) The injection of water and medicated solutions, including oil and glycerin, to promote the solution and expulsion of impacted calculi. (5) The injection of antiseptic solutions to disinfect and modify chronic infections in the gall-bladder and bile passages (Baudoin).

The indications above summarized cover practically all the conditions which in the past called for the instrumental exploration and catheterization of the bile passages, with the exception, perhaps, of drainage, which is always separately considered in the classic treatises.

The reasons for the gradual abandonment of the instrumental exploration and catheterization of the biliary tracts is quite evident when we regard this procedure in the light of the older surgery of the gall-bladder and bile passages, when the technique was defective and the methods of exposing the field of operation in the inferior surface of the liver were inadequate. The surgery of the choledochus and hepaticus was unknown and these ducts were practically inaccessible to the direct intervention of the surgeon. It is quite natural that any suggestion which would offer a prospect of clearing the biliary tract of any obstruction to the flow of bile should be grasped eagerly and developed to its fullest possibility. The need for these tentative, "groping in the dark" methods no longer exists in operative cases, not

only because we can explore *de visu* or by combined intra- and extracanalicular manipulations, and thus ascertain the difficulties in the way of normal bile drainage, but also because the one great reason for retrograde catheterization in the past—persistent biliary fistula after cholecystotomy—is rapidly disappearing.

In addition to these diminishing indications for catheterization, caused, as above stated, by the improvements in the technique, there are inherent difficulties in the practice of catheterization due to anatomical obstacles which have also contributed to its downfall and loss of prestige. As every student of anatomy knows, the normal cystic duct is guarded by Heister's valves, formed by the crescentic infolding of the mucosa, which offer a serious obstacle to the passage of an instrument into the common duct. In addition, the anomalies of implantation of the cystic duct into the gall-bladder and the tortuous twists and curves of this duct before it joins the choledochus have been made familiar by the laborious investigations of the surgeons and anatomists in recent years who have studied the anatomy of the biliary passages solely from the surgical point of view, and require no detailed consideration. Suffice it to mention in this connection the careful studies of E. Rose, Courvoisier, Terrier and Dally, Faure, Delbet, Hartmann, Hendrickson, Ernest Ruge, and the latest paper of Hans Kunze (1911), to prove that every anatomical feature of surgical value in connection with the normal and abnormal anatomy of the gall-bladder and bile ducts has been investigated, and that all the evidence in our possession simply confirms the conclusions already familiar to every experienced surgeon, that the normal bile tracts are subject to many anomalies and numerous variations which would make it impracticable to establish any fixed or definite rules for the catheterization of the cystic and common ducts by the gall-bladder route. There is no question, however, that the introduction of catheters or sounds into the duodenum through the cystic

and common ducts is a much moor feasible procedure in pathological than in normal conditions, especially when the gall-bladder and ducts are dilated by prolonged bile stasis caused by obstructions in the common or cystic ducts. In many cases, in consequence of bends or twists in the cystic, or because of the persistence of the valves of Heister, or because the duct opens into the gall-bladder laterally and not terminally, the introduction of the catheter becomes quite difficult even in pathological cases. In practice it has been found that the instrument can often be introduced into the duodenum, past the cystic duct, with surprising ease, while in others, insurmountable difficulties will be encountered which will make this procedure impossible in spite of the most persevering efforts. The catheterization of the cystic duct is, therefore, at best an uncertain procedure. These were the conclusions which Terrier and Dally arrived at in 1891, and they hold just as true today; but these are true in so far only as they apply to cases in which the attempt to catheterize is made through a fistula or opening in the gall-bladder already anchored and fixed to the abdomen, and not in the class of cases which we now have under consideration, or for the purpose that we have in view. However, it should be remembered that in a large percentage of cases the cystic and common ducts are permeable to catheters, especially to ureteral catheters, when introduced through a surgical fistula in the gall-bladder, and this can serve a very good purpose in many cases of persistent biliary fistula, as it has been my good fortune to demonstrate in several cases which have come under my observation in recent years.

In the earlier days of my surgical practice I was very timid of handling the gall-bladder, and much more so the common duct (not that my respect for it has grown less), and in consequence I did as little meddling as was compatible with the main purpose of my operation, which was to open, evacuate, and drain the gall-bladder. In consequence, the

operations were often imperfect, and some stones remained impacted in the cystic or common duct which I attempted to break up or crush by subsequent intravesical manipulations, more especially by washing out the calculi by frequent irrigations of the gall-bladder with mild antiseptic solutions. I found that hydrogen peroxide did far better than any other agent, because with the evolution of gas the calculi were detached from each other and from the adherent gall-bladder. I also learned to probe and catheterize the cystic and common ducts in order to remove obstructions in the way of the reëstablishment of the normal bile current, and in this way got rid of several persistent biliary fistulæ, which were so much more common then (1880 to 1890) than now. But it never occurred to me to test the value of the bile duct route as a means of relieving a water famine in the organism, and thus supplying the best means of supporting and stimulating the circualtion, until I had read McArthur's suggestion. In fact, I had already forgotten much of what I had once learned of catheterizing the bile tracts when the possibility of utilizing a catheter already acting as a drain in the common duct as a simple means of applying the McArthur drip for duodenal enteroclysis made me realize all the value of the almost forgotten method of biliary catheterization when applied in appropriate cases and in proper conditions.

The patient in this instance was a woman of Cuban birth, aged thirty-five years, who had suffered from chronic cholecystitis for nine years, complicated by a chronic appendicitis. At the operation a typically small, shrivelled gall-bladder was dissected out of a mass of omental and intestinal adhesions and drained. The appendix, which was also universally adherent and diseased, was removed. By splitting the cystic duct a rubber catheter drain, No. 7, English, was left in the common duct; the relic of the gall-bladder, sewed up, was left as a sheath to the drain. The operation under ether narcosis was tedious and laborious. The immediate

postoperative sequelæ were of little significance. On the second day all the signs of an impending anuria developed; only 9 ounces of urine were passed in twenty-four hours, and this was dark greenish black, stained with bile pigment and blood, showing a specific gravity of 1035, 25 per cent. albumin, and an immense mass of casts and epithelial debris. The urine toward the middle of the third day was being voided at long intervals in quantities not exceeding one ounce. The patient vomited incessantly. The rectum was exceedingly irritable on account of inflamed piles, and the Murphy drip, which was given with difficulty, was rejected or remained unabsorbed. The facies had become pinched and haggard; a marked icteroid tinge spread over the skin; the bile drainage was scant; the abdomen was tympanitic; the pulse was losing volume and steadily rising from 110 to 140; the temperature was low. Gastric lavage repeatedly applied relieved the vomiting only for a short time. In the presence of this ominous and forbidding situation, I fortunately thought of the easy route offered by the rubber drain which was ready for duty in the common duct. I at once began to work with it, so that with scarcely any effort I felt it slip through the papilla of Vater into the duodenum. At 11.30 A.M., August 3, I had injected 200 c.c. of warm salt solution, utilizing the barrel of a two-ounce glass syringe as a funnel. The vomiting began to abate at once, and none of the fluid was returned by mouth. From 11.30 A.M. to 7 P.M. 960 c.c. of tepid sterile water were injected into the duodenum in doses varying from 150 to 200 c.c., to which I had added 5 grains of diuretin to the dose. In the same length of time the patient had voided 27½ ounces of clearer and less albuminous urine. The improvement in the nausea and vomiting was remarkable. The bowels moved with copious discharge of flatus in response to the rectal flushes which previously had failed to act. During the night of August 3 the patient received 1170 c.c. (over 1 quart and 5 ounces) of warm Vichy water injected

by the bile duct route and passed 42½ ounces of urine, specific gravity, 1019, with only a trace of albumin and almost total diasppearance of bile pigment and blood. The biliary route was utilized in the same way systematically until August 25, when the catheter was removed to allow the wound to close. During this period diuretin, panopepton, strychnine, castor oil, Carlsbad water, and Hunyadi Janos in purgative doses were administered directly into the duodenum by the biliary route, much to the satisfaction of the patient, who was easily nauseated by even the sight of unpalatable drugs. The patient is now perfectly well and has gained steadily in flesh.

The experience which I have related is, I believe, a conclusive demonstration of the great value of the McArthur principle. On September 26, 1910, I had another opportunity to resort to direct infusion of the duodenum through a catheter introduced in the common duct. The patient, a man, aged forty years, was brought to me from Leland, Mississippi, suffering with a ruptured and gangrenous gall-bladder. A pericystic and subhepatic abscess had formed, and there was also an associate pancreatitis. The abscess, which was circumscribed by adhesions, was drained, the gall-bladder extirpated with a number of free calculi, and a drain was left in the common duct. The drainage of the common duct was especially difficult on account of the universal adhesions. The patient stopped breathing in the course of the operation, and in addition to artificial respiration he had to be infused intravenously to restore him from a complete collapse. He rallied, however, and all seemed well until the third day, when the signs of a progressive pulmonary infarct and septic hyperpyrexia suddenly developed and the patient succumbed on the afternoon of the fifth day. In this case a duodenal infusion through the catheter left as a drain through the common duct was not begun until the fifth day, seven hours before death, when the dyspnea, cyanosis, hemorrhagic vomit, fluttering pulse,

rising temperature, and capillary stasis made it quite evident that dissolution was near, and that all efforts at treatment would be fruitless. No attempt had been made to utilize the duodenal route before this, as the patient retained food by mouth without difficulty, and also absorbed the Murphy drip, which had been applied almost continuously. He also urinated freely without evidence of renal incompetency. Coffee, champagne, panopepton, and adrenalin were administered diluted in plain water directly into the duodenum through the drain which had been left in the common duct, but all to no avail, as can be readily understood from the nature of the case.

I have also resorted to catheterization of the biliary tract in four cases of biliary fistula. In one, a single catheterization with a large ureteral catheter pushed into the duodenum was sufficient to cure the fistula. This patient, an Italian woman, who had worried with the fistula over one month, recovered completely after allowing the catheter to remain *in situ* forty-eight hours. A cholecystostomy had been performed for multiple biliary calculi; over sixty-eight large and small stones were removed at the time of the operation, several of which were impacted in the cystic duct. It is possible that some fragments or debris of calculi were still lodged in the cystic or common duct, and that these were displaced by the catheter and the dilating effect of this instrument.[1]

In another case of biliary fistula following a cholecystostomy for multiple calculi and cholecystitis, referred to me by another surgeon, I succeeded in passing a flexible ureteral bougie, after irrigating the gall-bladder with adrenalin-cocaine solution (Schleich No. 1 + 10 minims of adrenalin solution). The bougie was followed by a ureteral catheter, and the

[1] This patient has been seen several times since the reading of this paper in December, and the fistula has remained closed, the patient reporting herself perfectly well.

fact that it had penetrated freely into the duodenum was established by the disappearance of several ounces of sterile saline solution injected through the glass barrel of a syringe attached to the catheter as a funnel. In this case the catheter was allowed to remain a week in position; after its removal the fistula closed and the patient recovered completely.

In a third case, a woman, aged fifty-four years, operated in a neighboring town in Louisiana, retained a fistula which alternately discharged bile and muco-pus. Several calculi had been removed from the gall-bladder at the time of operation, but the wound had never completely closed. She had been in this condition over six weeks. The fistula had apparently cured twice, but each time that this happened a painful swelling developed in the scar, which was followed by rigors and fever. On one occasion the scar yielded spontaneously and a profuse discharge of septic bile followed, with immediate relief of the symptoms. Again the fistula closed, and the signs of cystic retention compelled an incision which reopened the gall-bladder. When she came to me, the patient was wearing a drain. I enlarged the fistula by incision, under local anesthesia, sufficiently to allow me to introduce my index finger. I thought I could detect a small hard body at the bottom of the gall-bladder, which was itself very long and narrow. I then irrigated the cavity freely with a eucaine-adrenalin solution, and after working with a long, soft leaden probe and dull curette, succeeded in mobilizing a calculus which was washed out in fragments. Following this, I introduced a ureteral catheter until it had disappeared two feet beyond the surface of the skin, and made sure it was not coiled and that it was lying in the duodenum by injecting several ounces of plain water, which promptly disappeared in the intestine. The catheter was allowed to remain *in situ* for two days and was then removed. Bile flowed in considerable quantity for two days, and the fistula then closed rapidly. The patient returned to her

home in the country perfectly well ten days after the fistula had healed. She has never complained since.

The fourth case is the most instructive. A farmer from Mississippi, aged forty-nine years, had been operated twice for gallstones in a neighboring city. The first time his gall-bladder was drained and several calculi were removed. The wound closed, but he developed a secondary retention followed by chills and fever, and another surgeon removed his gall-bladder, or at least a part of it. Several weeks elapsed, and the patient returned home with an unhealed fistula, from which the bile flowed freely. Whenever the fistula contracted sufficiently to obstruct the flow of bile, severe chills and fever immediately followed. He then consulted me at the Touro Infirmary. He was quite weak and emaciated from protracted fever and sepsis. His stools were pale from lack of bile, and he was slightly jaundiced. I began by dilating the fistula, and found that the opening led to a narrow pocket lined by mucous membrane, which admitted half the length of the index finger. The pocket was then freely irrigated with Schleich-adrenalin solution, followed by hydrogen peroxide, and an effort to detect an impacted stone was made, but no calculus was found. I then introduced a Kelly cystoscope of large caliber with an attached light, and by searching carefully I recognized two distinct openings at the bottom of the pocket.

I then introduced a ureteral catheter into one of these, but failed to advance farther than an inch in that direction. I tried the maneuver on the other opening, and was gratified to find that the catheter disappeared easily, its full length, into the duodenum. That the catheter was in the duodenum was easily proved by the rapid disappeaarnce of half a pint of water, which was allowed to trickle into the catheter through a narrow funnel. I allowed the catheter to remain *in situ*, with two feet of its length lying within the gut. The patient expressed no discomfort, and I allowed the catheter to remain undisturbed for three days. In the meantime the

patient expressed himself as unusually well; the appetite returned, and the stools promptly assumed a normal brown color. The fever completely subsided. No bile escaped externally. Evidently the normal flow of bile had been restored. I thought the obstruction, whatever had been its nature, had been overcome and that the trouble was over. The catheter was removed. Nothing occurred except that bile appeared externally the following night, and after this the fever and chill returned. It was evident that the obstruction had recurred and that the flow of bile in the common duct was again interfered with on the removal of the catheter. I at once reintroduced the catheter without serious difficulty, and the patient was once more comfortable. No fever, no chills; good appetite and normal stools so long as the catheter remained *in situ*. He remained in the Infirmary under observation for one week, during which he gained rapidly in flesh and his complexion cleared up completely. I was preparing to remove the catheter a second time, when the patient decided that he must return home at once, and suggested that I supply him with an extra catheter in case the first one I had placed should wear out before he could return. I removed the catheter and with the greatest ease replaced it by a new one, and I allowed him to go home. I received a letter from him two weeks after, stating that he was feeling so well and had gained so much in flesh that he felt perfectly safe with the catheter, and, if I saw no objection, he would prefer to remain home for a month or more to attend to his farm, which sadly needed his presence. In the meantime, he and his wife had been experimenting with the catheter, and, as he informed me subsequently, she has learned how to pass the catheter herself, she had no difficulty in passing a new one when the old one showed signs of erosion by the action of the intestinal juices. He has written me several times since, stating that the ureteral catheters wear out, as they are digested and partially dissolved by the action of the intestinal juices, so that they

soon lose all their firmness in about two weeks. He is regularly supplied with Porges' French ureteral catheters No. 5 or 6, by a local dealer. Thus far he has decided to continue wearing the catheter rather than take the chances of another operation.[1]

I have dwelt at considerable length on the history of this case because of its instructive features, and chiefly because, taken together with the cases previously related, it proves conclusively that the fear of an ascending infection spreading from the duodenum to the ducts and causing a septic cholangitis is unfounded, or at least, is not likely to occur so long as there is no bile stasis and so long as the normal flow of bile through the choledochus is thoroughly established. These experiences also prove conclusively that a catheter may remain almost indefinitely in the bile tract and in the upper bowel without causing any appreciable disturbance and with perfect toleration.

Conclusions. From my limited but very satisfactory experience since last August (1910), I am inclined to prefer

[1] As this paper is going to the printer five months have elapsed, and this patient is still wearing his catheter with seemingly no ill effects. He has written me several times, stating that apart from the inconvenience of wearing this instrument, which he holds in place with a light dressing and a belt, he is perfectly well and is able to attend to his duties on the farm with as much satisfaction and regularity as he did when he was well. No bile flows from the fistula, which is barely large enough to admit the ureteral catheter. He expects to return to the Infirmary some day to undergo an operation, if necessary, which will relieve him of the catheter and of the fistula. I have not been able to explain the mechanism of the obstruction in this case except by supposing that an angular bend or valve has formed at the junction of the hepatic and common ducts as a result of traction on the stump of the gall-bladder when the operator attempted to anchor or suture this through the abdominal wall at the time when the partial cholecystectomy was performed. The angle or bend which partially interferes with the flow of bile in the choledochus is probably effaced by the catheter *in situ*. If this condition is not ultimately corrected by the persistent use of the catheter, the only solution to the problem will be to release the stump of the gall-bladder from its present attachment to the abdominal wall, thus allowing it to drop back to its normal position without tension, the cystic stump being closed by ligature.

the infusion of fluids directly into the duodenum through a catheter whenever this is possible or practicable, rather than inject the gall-bladder so that the fluid may find its way to the bowel by the ducts. For this purpose I have found nothing so effective as a ureteral catheter of the largest sizes (No. 4 and 5 Porges), which is allowed to penetrate into the bowel for one-quarter or one-third its length. In cases in which the catheter can be introduced, it is the method to be preferred. It can be readily conceived that there are cases, and many of them, in which catheterization is not practicable after the abdominal wound has been closed. In such cases the slow instillation of fluids through a drain introduced in the gall-bladder in the cautious manner recommended by McArthur is the proper procedure, provided the presence of bile in the drain demonstrates the patulous condition of the cystic duct. In this way the McArthur procedure as applied directly to the duodenum becomes the analogue of the "Murphy drip" as applied to the lower rectum.

The advantages of direct catheterization over the simple instillation of fluid in the gall-bladder are the avoidance of pain from overdistention and the greater certainty of injecting the desired amount of fluid into the bowel at a given time. My experience only emphasizes the value of the underlying principle that McArthur has taught us. My technique has differed a little from his, but the fundamental facts which he has so ably established and advoctaed remain unaltered. It is quite evident that theoretical objections will be raised by many who have not had an opportunity to test the method or who may meet with exceptional conditions which may render the method inapplicable. The fear of infection of the bile tract by the contact of the catheter with the duodenal contents is amply disproved by the experiences related in this paper. We may safely leave to time and further experience the test of the true value and legitimate place of this procedure in our operative therapy. One fact will remain undisputed, viz.,

that nowhere is absorption so active or so normal as in the upper duodenum. Whoever has had occasion to test the efficiency of the upper as compared to the lower (rectal) route as an avenue to the circulation must be convinced that this, in a physiological sense, is infinitely the more efficient and preferable, whenever it can be made available for the purposes of the surgeon.

Finally, my chief aim in this communication is to encourage others in the application of this valuable suggestion in the cases in which it is especially indicated. It is an added means of accomplishing an end when for one reason or another, in a case of cholecystostomy or choledochotomy, the means already at hand (ingestion per os, proctoclysis, hypodermoclysis, etc.) cannot be employed or are insufficient to relieve a serious or menacing situation.

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DISCUSSION

Dr. Mack Rogers, of Birmingham.—In my opinion, this paper marks an epoch in the progress of biliary surgery. We have all keenly felt the need of such a thing as the doctor has so beautifully brought out. I have been intimately associated with the development and progress of the surgery of the gall-bladder and bile ducts. Early in our experimental work on the common bile duct, in the dog, we appreciated the need of a direct communication between the open gall-bladder and the intestinal canal.

First, in order that we might be absolutely certain that both the cystic and common bile ducts were open, and second, that we might use this canal for irrigating purposes. These considerations led me, in those early days, to attempt to pass a small malleable metal probe through these ducts. The resistance was so great that I did not have the courage to press my cause, and exchanged the probe for an ordinary filiform bougie, such as is used in urethral work; this, of course, was a failure also; and as the ureteral catheter that the doctor uses was not in use at that time, it was not employed. These results are not to be wondered at when one reflects upon the anatomical arrangements of this canal, the sharp curve usually found in the neck of the bladder, the spiral valvular arrangement of the mucous membrane lining the neck of the gall-bladder and cystic duct, and the fact that the common duct often passes through the head of the pancreas, and the great danger I was incurring of perforating this duct as it passes through the pancreas.

These were the barriers that deterred me in exploring this route, and caused me to abandon it as an impractical thing. However, when Dr. Summers, of Omaha, suggested the use of the purse-string in the gall-bladder, I took new courage and tried by gravity to force fluid through these ducts, but alas! I was again doomed to disappointment. However, I have never ceased hoping to see this way developed. So I feel that this Association is especially fortunate in having this most practical subject presented to it by one of our masters.

I believe, Mr. President, that this device is going to clear up the complications and yield better results in our biliary surgery than any event that has occurred since the introduction of drainage of the common bile duct.

Dr. J. Garland Sherrill, of Louisville.—This is a valuable contribution, and I hope this operation will prove as satisfactory as Dr. Matas seems to think. I would utter a word of caution just here. If you fix a tube into the common duct and fasten it, which you probably have to do if the patient is going

to vomit, it will be difficult to push it on down into the intestine. If you use the gall-bladder itself, you can put water in the gall-bladder and it will trickle down into the intestine. If the fluid gets into the intestine it will be a benefit, but I should imagine the danger of the method would be greater than the benefit which will accrue. There is danger of pushing a tube blindly into the cavity. You may push it out into the peritoneal cavity and tear a hole in the gut, and the danger of so doing is far greater than any probable good which it would produce. I do not think we ought to let this paper go without this word of caution to the men who have not the skill and the good judgment of those who have proposed this operation and have been using it.

Dr. Stephen H. Watts, of Charlottesville.—I would like to ask Dr. Matas a question about the introduction of this tube. It has been my custom, in cases of common duct stone, with stasis of bile, to insert the tube so that it points toward the hepatic duct. It seems to me, it would be necessary, in case you want to introduce fluid into the duodenum, to make use of a T-shaped tube, or else to make use of two tubes, if you find it necessary to drain the hepatic duct as well. It seems to me there is a disadvantage in using the T-tube for introducing fluids, because you may carry the infection up into the hepatic duct.

Dr. William C. MacCarty, of Rochester.—Like Dr. Sherrill, I think the method outlined in this excellent paper should have a little restriction, not for the members of this Association, but for those practitioners who are not as skilled as the members of this body.

My experience in regard to surgery of the gall-bladder and the bile passages has been simply this: In standing by the side of the Drs. Mayo and witnessing about 1500 operations upon the gall-bladder, and seeing into the gall-bladder, and studying the work of other surgeons, I have always found that the surgeon, when he sees bile come into the gall-bladder, is so happy that he is willing to stop, put in a drain, and leave it. I would like to say also that we are dealing with very small ducts, very delicate and essential anatomical structures, and that much manipulation of these ducts might cause serious disturbance, a disturbance that no surgeon can correct, so that the surgeons with whom I have come in contact have been only too glad to get out with as little manipulation as possible.

There is another point about which Dr. Matas mentioned something, *e. g.*, stimulation of the intestines due to the fluids that are put in through the ducts. We all know that nature attempts to stop stimulation of the intestines when they are involved in an inflammatory process. Indeed, nature tries to

do this to such an extent that there is often complete paralysis of the duodenum and even the stomach. Even acute dilatation of these organs occurs, so that nature early in the postoperative stage does not want stimulation, but absolute rest.

I should like to ask Dr. Matas, if I may, how often he has seen acute dilatation of the stomach and duodenum after this procedure, and whether this condition occurs much less after this treatment than under the old treatment?

Dr. John E. Cannady, of Charleston.—I have only a word or two to say. In attempting to catheterize the common duct, the hepatic and cystic ducts, I have used the ureteral catheter without any serious trouble, but I believe it would be quite dangerous to use a stiff, hard instrument in these cases. I do not see any particular objection to using a soft ureteral catheter, and I do not believe any harm could accrue to the patient from the use of that instrument in such cases.

Dr. Rufus B. Hall, of Cincinnati.—I would like to ask Dr. Matas one question, and if possible to make it plain. In operating on the liver, where I open the common duct, I have been accustomed, after making a fish-tail slit in the rubber tube, to stitch that tube to the common duct, fixing it with catgut, and letting it remain until the catgut is absorbed, so that you can remove it, or use sterile catgut in the place of chromicized catgut. If the tube sticks in the common duct, if he determines to push another catheter or the same catheter on through into the bowel, I would like to ask him how he is going to get the catheter loose, or does he put a smaller catheter through the drainage tube into the intestine?

Dr. Maurice H. Richardson, of Boston.—I have come here to learn, and had no intention of taking part in this discussion. For many years I taught anatomy in the Harvard Medical School. In the early years of my teaching we had nothing to say of the surgical anatomy of the foramen of Winslow. In recent years we have attached very great importance to the anatomy of the right upper quadrant of the abdomen. I used to teach that you cannot easily put a probe down through the cystic duct, because it has valves in it and is S-shaped. Not only is it difficult in health, but unless the hepatic duct is dilated, it is difficult to put any instrument into that; especially is it hard to insert a rubber drainage tube. When Professor Kehr years ago talked about putting a catheter into the hepatic duct in every case for drainage, I was myself somewhat doubtful about it. I could not easily do it; and I cannot now easily put a catheter into the normal hepatic duct. As one of the gentlemen (Dr. MacCarty) has said, these ducts are small structures, and in health it is very hard to find them. In disease, if the

common duct is as large as one's finger and as thick as the aorta, nothing is easier.

I am really seeking information, because I am confident, from work that I have done on the biliary ducts, that it is difficult to pass an instrument from the gall-bladder into the common duct unless there is a great dilatation of the cystic duct.

Dr. Hall.—When you have the common duct open, is it difficult to pass it into the intestine through that?

Dr. Richardson.—There is very little difficulty in passing a probe from the common duct into the duodenum. It is best to use a large probe rather than a small one. Gentle force must be used. When the duct is distended and thickened by chronic obstruction, with care instruments may be passed into the duodenum. The frequency with which stones in the hepatic and common ducts may be overlooked, makes careful exploration of both imperative. I do not believe that it is always possible to find the last stone in the hepatic duct; but by digital examination of the common duct, with instrumental sounding, it ought to be possible to say beyond a question that no stone remains there. The passage of a large probe into the duodenum does not, unfortuntaely, prove that a fragment may not remain. Dilatation with the fingers, as W. J. Mayo recently described to me, makes the overlooking of a stone in the common duct impossible; and, furthermore, if any do escape into the hepatic duct, this dilatation allows any stones that may be left an easy way of escape through the dilated papilla.

Dr. F. W. Parham, of New Orleans.—I merely want to call attention to the advantage of the umbrella catheter. It is a catheter which can be used as a tractor and can be serviceably employed for the purpose of introducing fluid into the gall-bladder, not, however, by extension of the tube into the intestine, but only as a method for introducing fluid into the gall-bladder.

Dr. Alexander Hugh Ferguson, of Chicago.—I did not intend to speak on this subject, but in my early work I had to deal with many cases of biliary fistula, on account of the gall-bladder being sutured to the skin à la Tait. At that time we used to have about $33\frac{1}{3}$ per cent. of biliary fistula following cholecystotomy. For that reason, Murphy devised his button, and performed what is konwn as cholecystenterostomy or gastro-jejunostomy for the cure of bile fistula.

A case came to me from Mexico, having been operated on by another surgeon; there was a biliary fistula. I tested the patency of the duct with water, and we did the same thing with air, although I could not catheterize the cystic duct; I could not pass any instrument through the ducts, but still I could pass

water through them. The night before operation for closing the fistula I passed two douche-bags full through the ducts, which moved his bowels. After that I tried to catheterize the ducts in a number of cases. In all those cases from which we removed gallstones from the gall-bladder and cystic duct, and the cystic duct was not destroyed by the gallstones, we could pass a bougie. A male bougie has the proper curve for getting into the common duct from the fistulous opening through the gall-bladder and cystic duct. I know of two cases which the late Dr. Nicholas Senn had been catheterizing for a long time, trying to get rid of the biliary fistula. Then the suggestion of McArthur's came up, and I have used it frequently. It is practical, and in the hands of the experienced surgeon there is little or no danger connected with it.

Dr. Matas (closing).—It was difficult to discuss, in the short time at my command, all the collateral questions which follow the presentation of the fundamental proposition which I have presented in my paper. Several, if not all, of the objections raised by the Fellows who have spoken have been anticipated in the text of the paper, which was not read, and will appear when the paper is published. For the same reason, I fear that neither Dr. McArthur's position nor mine has been sufficiently understood. It is not claimed by Dr. McArthur or myself that duodenal infusion or injection is to be adopted as a routine procedure in every case of cholecystostomy, but that it is applicable with great advantage in many cases in which the introduction of fluids in large quantities for diluent, medicinal, or nutrient purposes is especially called for, and that this is an urgent desideratum in many cases, especially in dealing with toxic subjects, cannot be denied. I have gone a step farther than Dr. McArthur in resorting to direct catheterization of the common duct via the gall-bladder, so as to reach the lumen of the duodenum directly, and this procedure, I contend, is practicable and safe in many, if not all, cases in which choledochus obstruction exists and in which common duct drainage is necessary for the relief of the obstruction. I do not believe that there is any risk of infection from the duodenum so long as the bile current is unobstructed and flows directly down to the bowel; the danger of infection lies in stasis and obstruction of the common duct when the biliary tract is already infected. Furthermore, the clinical facts plainly show that the dangers of biliary infection from a catheter lying in the upper bowel are mythical and visionary so long as the common duct is pervious. As to the value of the procedure, the facts referred to in my case are conclusive. Here was a patient in a toxic state, to whom we could not give a drop of water by mouth, nor could we give any

by rectum, and the only route available was the hypodermal. Anuria or suppression of urine from an acute postoperative nephritis was facing us. Fortunately, a catheter was already in the common duct, and all that I had to do was to push it farther until it got into the duodenum. I have already told you the remarkable results that followed the injection of water and other fluids through the catheter, and how the patient promptly recovered.

I would like to take up each one of the points raised by the gentlemen who have spoken, but the time allowed for closing the debate has nearly come to an end, and I feel that I can more profitably utilize the remaining margin of time by reading the final conclusions of my paper (not previously read), as these will tend to define Dr. McArthur's and my position on the subject. (Here Dr. Matas read the conclusions of his paper.)

Dr. Jonas.—Did you push the drainage tube in the common duct farther into the duodenum, or did you push another smaller catheter through the tube?

Dr. Matas.—Yes, the original tube was pushed into the duodenum because I had already placed it in the common duct. In another case I had a tube in the intestine through the common duct and irrigated through that. In regard to the tolerance of the ureteral catheter by the patients suffering from biliary fistula, I will say that I sent a patient home for two weeks with two feet of catheter (a ureteral catheter) in the intestine. This was allowed to remain in place in the hope of dilating the stricture at the papilla of Vater and allowing the bile to flow through the normal channel. At the end of two weeks the patient came back with the catheter in place, and when I took it out the fistula closed. He has never suffered from infection since. On the contrary, he was suffering from jaundice, with chills and fever, until relieved by catheterization of the duct through the external fistula.

WILLIS GOSS MacDONALD, M.D., LL.D.

IN MEMORIAM

WILLIS GOSS MacDONALD, M.D., LL.D.

After a short illness, Dr. MacDonald died at his home in Albany, N. Y., of pneumonia, on December 30, 1910. Although every effort was made by his professional friends, it was apparent in the early stages of the disease, that his exceedingly fleshy condition made every form of heroic treatment futile, and thus passed from our midst not only a skilled surgeon, but one who embodied every quality of sterling manhood.

Dr. MacDonald became a member of the Southern Surgical and Gynecological Association in 1900.

He was born at Cobleskill, N. Y., April 11, 1863, and was a descendant of Benjamin MacDonald, who came to this country from Scotland in 1759, first locating in Coeymans, N. Y., then later in Schoharie County. Dr. MacDonald graduated from the Cobleskill Academy in 1878, then attended the Albany State Normal School, and Cornell University. He was a student in the office of Dr. Albert Vander Veer, Albany, and was graduated from the Albany Medical College in 1887. He was a profound student, noted for his original observations, which were made at a time when antiseptic surgery and bacteriology were claiming the attention of the thinking members of the medical profession. He served as house surgeon at the Albany Hospital for eighteen months, then spent a year at the University of Berlin, taking special courses in surgical pathology, bacteriology, and general surgery, and coming under the direct instruction of Professors August Martin, Ernest Von Bergmann, and their assistants. After his return to Albany he became associated with Dr. VanderVeer, and was successively

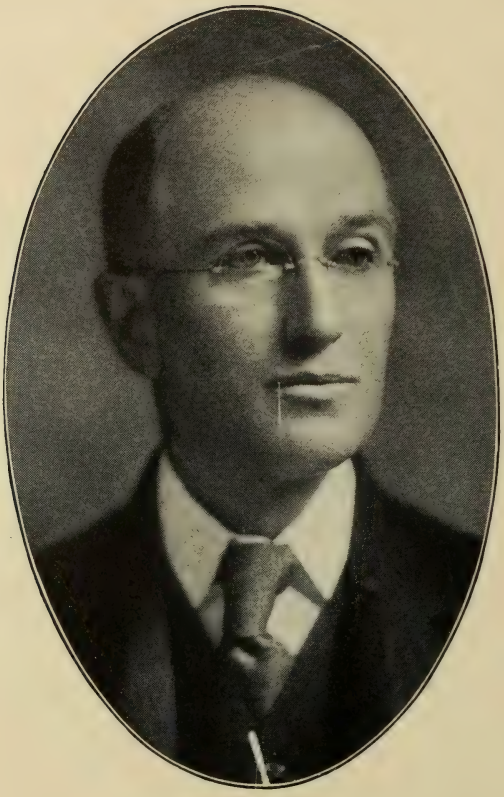
instructor, lecturer, and professor in the Albany Medical College. Dr. MacDonald became assistant attending surgeon at the Albany Hospital, serving from 1892 to 1897, since which time he has been attending surgeon. He was connected with many professional and civic organizations, to wit, consulting surgeon to Westfield, Mass., General Hospital; a member of the Board of Education, Albany; principal organizer of the South End Dispensary, serving continuously as president of its staff; member and ex-president, Medical Society, County of Albany, also the Medical Society of the State of New York; a member of the International Congress; American Association of Obstetricians and Gynecologists; a Fellow of the American Surgical Association; of the Southern Surgical and Gynecological Association; of the Pan-American Medical Congress; the Tenth, Eleventh, and Twelfth International Medical Congress; of the Fort Orange, Albany, and University Clubs of Albany.

He was a masterful operator, had a remarkable capacity for attaining, retaining, and imparting knowledge, and a warm advocate of all that was true, good, and beautiful in life and character. Dr. MacDonald was a man of varied ability, and an extremely successful student in medico-legal work. He made his reputation early and retained a foremost position in the comparatively few years in which he practised his profession.

He had a loyal affection for his friends, and even continued to hold the respect of those whom he opposed.

During the Spanish-American War, Dr. MacDonald was commissioned major and surgeon of the United States Volunteers, having charge of the surgical division of the Military Hospital at Fort McPherson, Ga., and gave not only his services, but liberal contributions of instruments, surgical dressings, etc., to his country and its defenders. For a man of his physique he performed a remarkable amount of work during his lifetime, and his connection with the Albany Medical College was always a wholesome one.

In the practice of his profession Dr. MacDonald has left a worthy example to students and members.



JOHN CUMMINGS MUNRO, M.D.

JOHN CUMMINGS MUNRO, M.D.

JOHN MUNRO, who was beloved by all the surgeons who knew him, died at his home in Boston, December 6, 1910. He had been operated upon three years before for carcinoma of the bladder. He was afforded very great relief and enabled to carry on his active work until the very last. Knowing the probabilities of recurrence, it was peculiarly touching that he should have been so brave and resigned. He was on the program for the last meeting, and fully intended to come until a few weeks before. Unfortunately, he was not permitted to come, and died a week before the Nashville meeting. He had been a member of the Association since 1905, and had greatly endeared himself to the entire membership.

He graduated at the Harvard Medical School in 1885, and was one of the best-known surgeons in New England. Establishing himself in general practice in Boston, he soon began to specialize in surgery, developing a rare skill which placed him early in his career in the front rank of the profession. Dr. Munro was associated with the Harvard Medical School as assistant in anatomy from 1889 to 1893; assistant demonstrator of anatomy from 1893 to 1894; assistant in clinical surgery from 1894 to 1895; instructor in surgery, 1896 to 1902; and lecturer in surgery, 1903 to 1905. He was keenly interested in the development of surgery, toward which his work was a great contribution. He was surgeon at the Boston City Hospital, 1893 to 1903; consulting surgeon, St. Luke's Home, 1901; special consulting surgeon, Quincy Hospital, 1902; consulting surgeon, Framingham Hospital, 1905; surgeon to out-patients, Carney Hospital, 1891 to 1896; and surgeon-in-chief, Carney Hospital, since June, 1903. He was a member of the American Medical Association, and chairman of the Section on Surgery in 1909; Association of American Anatomists, American Surgical Society, Clinical Surgical Society, of which he was president in 1905;

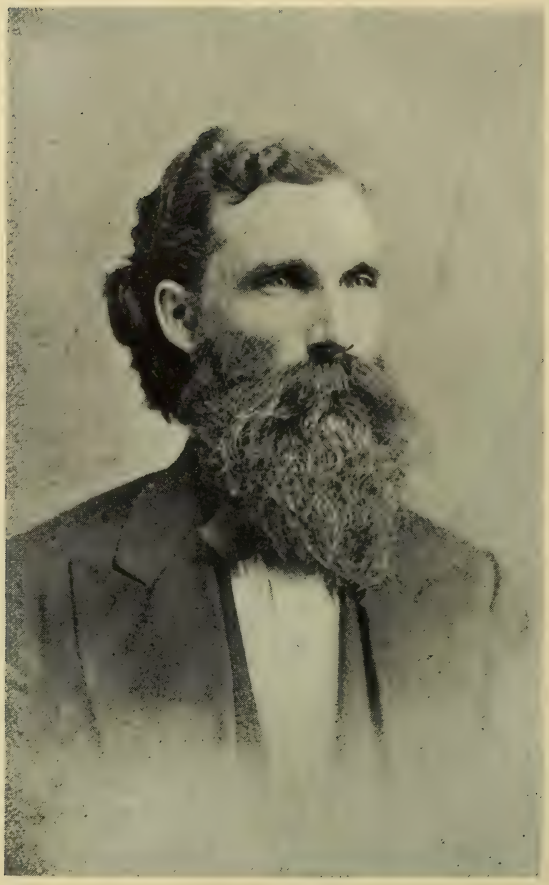
Boston Society of Medical Sciences, Boston Society for Medical Improvement, American Academy of Medicine, Southern Surgical and Gynecological Association, an honorary member of the Vermont Medical Society, the Canadian Medical Association, and the Philadelphia Academy of Surgery.

Dr. Munro belonged to the group of surgeons who went through a long apprenticeship in anatomy as a preparation for surgery. He was noted for his skill in dissection, and for the simplicity and clearness of his demonstration. To this anatomical training was probably due, in a large measure, the technical skill in operation which so distinguished him. He combined, however, with this technical skill accuracy in diagnosis and remarkable surgical judgment. Entering into surgery at the beginning of the antiseptic period, he quickly acquired a thorough mastery of the details of the method.

Dr. Munro will best be known for his surgical clinic at the Carney Hospital, which was instituted in 1903. The establishment of this clinic, which carried with it responsibility for the entire surgical service of the hospital, was an important event, as it was the first permanent surgical service to be established in New England. The clinic, under Dr. Munro's guidance, quickly acquired a high rank among the surgical clinics in the country, and, of the surgical clinics in New England, was among the best known and the most frequently visited. His work there served a most useful purpose in various ways. It demonstrated the possibility of doing satisfactory surgery, successful in its results, with simplicity of plant and technique, and with a minimum of red tape. In its instruction it had to do with and reached not so much the undergraduate in medicine as the general practitioner, the worker in the surgical field, the visitor in search of sensible ideas and their application in the field of surgery. At this clinic true charity to the deserving poor was dispensed. The widespread abuse of the charity of the medical profession was here combated in the only way in which a successful struggle against it can be made, by refusing charity to those who do not merit it. Dr. Munro not only had strong convictions on this matter, but had the courage to put these convictions into practice in the face of much unfavorable and unjust criticism.

Dr. Munro was well known both in this country and abroad. His contributions to the literature of surgery were numerous and on a variety of subjects. He wrote as he spoke, simply and clearly, and was always conservative and modest in stating his part. His skill as a surgeon was acknowledged by all. Back of it, however, and revealed to but few, were qualities of mind and heart that deserve more admiration than his skill, and made the man even greater than the surgeon. Fearless honesty in all things, staunch loyalty to his ideals and to his friends, straightforwardness in his actions, simplicity and cleanliness of life, and modesty as to his self and his achievements were strong characteristics of John Munro. Keen in his observation of men and their methods, he was always charitable in his judgments of both. Travelled, well versed in general literature, appreciative of art in all its aspects, he made a most charming companion. His influence on his fellows was wide and stimulating. A hard worker himself, he incited younger men to action, and his hand was ever ready to aid and encourage them in honest endeavor.

Though naturally undemonstrative and retiring, he was a loyal friend, and the place he occupied in the affections of the many who knew him for his worth will not be filled.



J. T. WILSON, M.D.

J. T. WILSON, M.D.

One of the Founders of the Southern Surgical and Gynecological Association, Dr. J. T. Wilson, died in Washington, D. C., May 22, 1910. He was born on a plantation in Prince George County, Maryland, about sixty miles from Harper's Ferry, in 1846. In the early part of the Civil War, the State of Maryland getting under the military control of the United States, he with twelve other young men ran the blockade across the Potomac and made their way to Richmond, Va., where he joined a Maryland battery of artillery and fought in many battles until the close of the war, when he came to Richmond. He then finished his literary education and studied medicine, graduating at the Jefferson School in Philadelphia in 1867.

After graduating he served as interne at Blockley Hospital. After this he located in the State of Missouri, where he practised until the year 1876, when he moved to Sherman, Texas, where he lived until his death. In November, 1908, he was called to Baltimore to attend a sick brother, and about the time the brother was recovering he himself was stricken with a severe attack of pleuritis, from the effects of which he suffered continuously for many months until his death.

Dr. Wilson was well known throughout the South. At one time he was superintendent of the insane hospital at Austin, and later of the State insane hospital at Terrell. His management of these institutions was characterized by the utmost care and kindness for the unfortunate insane. The treatment of nervous diseases and the insane was his delight.

His constant aim was to place the profession of his choice on high ground. He did much to secure the passage of the present State health laws and the laws regulating the practice of medicine in his adopted State, and was president of the first Board of State Medical Examiners.

He was kind in disposition, always freely bestowing his services on the poor as well as on the rich of his clientele. He was noted for his uniform politeness and ethical treatment of his medical confères, and his extreme modesty forbade his boasting of his achievements even in the slightest degree. His knowledge of parliamentary law, coupled with his other good traits, made him an ideal presiding officer over medical meetings. He was many times president of the Grayson County Medical Association, and was also president of the Texas State Medical Association, 1908–09.

Dr. Wilson was a charter member of the Southern Surgical and Gynecological Association; he served as vice-president from 1891 to 1892. Until failing health prevented, his genial manner and charming personal presence were rarely ever missed from the annual meetings. Dr. Wilson stood for, and represented, in both his personal and professional life-work, the very highest and best ideals of true manhood and of the cultivated, elegant, polished, and gentle physician. A gentleman of the old school, with its characteristic dignity and politeness, and yet with the firmest of conviction and steadfastness of purpose, that made him, throughout his whole life, a power on the side of personal and professional rectitude. If there were more men of the type of Dr. Wilson in its ranks, it would be far better for the fair name of the profession of medicine. He has gone from among us and we shall not soon see his like again.

INDEX

Abdomen and pelvis, pain in, 452
Abdominal and pelvic outlet operations, 170
Abscess of kidney, 461
Adenomata of intestine, 391
Address of president, 1
Aneurysm, 190
Anteflexion of uterus, 178
Appendicitis, chronic, 484

Bartlett, W., exposing the bladder in suprapubic operations, 70
Bladder, diverticulum of, 467
Blair, V. P., palate defect after infancy, 479
Bovée, J. W., abdominal and pelvic outlet operations, 175
    treatment of cancer, 376
Breast, carcinoma of, 262
Brown, J. Y., acute intestinal obstruction, 241, 250
Bryan, R. C., stone in the ureter, 72
Burch, L. E., complications following operative procedures, 199
Byford, H. T., pylorospasm, 423
    renal tuberculosis, 119
    treatment of anteflexion of the uterus, 178, 184

Cancer, injury as a causative factor in, 271
    operations for, 467
    treatment of, 346
    uterine, 363
Cannady, J. E., operation on the upper bowel, 515
Carcinoma of the breast, 262
Cecum, sarcoma of, 391
    undue mobility of, 484
    volvulus of, 381
Cesarean section, 138
Cholecystoduodenal catheterization, 490
Clark, J. G., symptoms simulating chronic appendicitis due to undue mobility of the cecum, 484
Cole, H. P., transfusion in pellagra, 426, 431
Coley, W. B., injury as a causative factor in cancer, 271, 375, 379
    operations on the gall passages, 34
    renal tuberculosis, 117

Crile, G. W., operations for cancer, 470
Crofford, T. J., complications following operative procedures, 204
ectopic gestation, 137
Cullen, T. S., exposing the bladder in suprapubic operations, 68
large ovarian cysts, 188
malignant intestinal growth, 370, 377, 380
operations on the gall passages, 31
tumor of liver, 42
Cunningham, R. M., treatment of cancer, 375
Cysts of pancreas, 252
ovarian, 185

Danna, J. A., omentopexy, 238
tumor of liver, 43
Diverticulum of the bladder, 467

Earnest, J. G., ectopic gestation, 131
Echinococcus cyst of the liver, 35
Ectopic gestation, 121
Elbrecht, O. H., complete destruction of the spinal cord, 443
renal tuberculosis, 116
Exposing the bladder in suprapubic operations, 64

Ferguson, A. H., abdominal and pelvic outlet operations, 176
complete absence of the vagina, 147, 169
exposing the bladder in suprapubic operations, 71
large ovarian cysts, 188
omentopexy, 236
operation on the upper bowel, 516
tumor of liver, 41
Fibroid tumors complicating pregnancy, labor, and the puerperium, 446
Formation of a plastic vagina, operation for, 147
Fort, R. E., complete destruction of the spinal cord, 441, 442
omentopexy, 235
operations on the gall passages, 33

Gall-bladder and biliary tract an available therapeutic route to the upper bowel, 490
Gall passages, operations on, 25
Goggans, J. A., cysts of the pancreas, 261
Goitre operations, 205
Grant, H. H., omentopexy, 235
Guerry, Le Grand, thyroidectomy, 216

Hall, R. B., cysts of the pancreas, 252
ectopic gestation, 132
formation of a plastic vagina, 167
intussusception in the adult, 406

Hall, R. B., operation on the upper bowel, 515, 516
Holden, G. R., chronic urethritis, 61
Horsley, J. S., acute intestinal obstruction, 247
ectopic gestation, 133
exposing the bladder in suprapubic operations, 67
large ovarian cysts, 185, 189
Hunner, G. Le Roy, chronic urethritis and chronic ureteritis caused by tonsillitis, 44, 63
intussusception in the adult, 405
renal tuberculosis, 115
treatment of cancer, 374
Hypernephroma arising in the right testicle, 408

Importance of preserving the gall bladder in operations on the gall passages, 25
In memoriam, 519
Injury as a causative factor in cancer, 271
Intestinal growth, malignant, 370
obstruction, acute, 241
Intussusception in the adult, 391

Jonas, E., anteflexion of uterus, 183
complications following operative procedures, 204
exposing the bladder in suprapubic operations, 67
operation on the upper bowel, 518
renal tuberculosis, 113
thyroidectomy, 216
Johnson, J. T., fibroid tumors complicating pregnancy, labor, and the puerperium, 446

Kelly, H. A., best method of exposing the interior of the bladder in suprapubic operations, 64, 71
chronic urethritis, 61
ectopic gestation, 135
operations on the gall passages, 31
renal tuberculosis, 118, 120
Kidney, abscess of, 461

Lewis, E. S., Cesarean section, 144
large ovarian cysts, 189
Liver, tumor of, 38
Long, J. W., ectopic gestation, 134
importance of preserving the gall-bladder in operations on the gall passages, 25, 34
transfusion in pellagra, 430

McArthur drip, remarks on, 490
McGannon, M. C., formation of a plastic vagina, 167

McGuire, S., pylorospasm, 419, 424
McMurtry, Lewis S., Cesarean section, 138, 146
McRae, F. W., acute intestinal obstruction, 249
MacCarty, W. C., carcinoma of the breast, 262, 377, 379
hypernephroma, 418
operation on the upper bowel, 514
pylorospasm, 423
MacDonald, W. G., obituary notice of, 519
Malignant intestinal growth, 370
Mason, J. M., acute intestinal obstruction, 249
chronic urethritis, 61
renal tuberculosis, 104, 120
Matas, R., gall bladder and biliary tract an available therapeutic route to the upper bowel, 490, 517, 518
omentopexy, 237
Mixter, S. J., diverticulum of the bladder with epidermal lining, 467
omentopexy, 236
Moore, J. E., acute intestinal obstruction, 250
omentopexy, 233
Morris, R. T., omentopexy, 234
thyroidectomy, 214, 218
Multiple adenomata of intestine, 391
Munro, J. C., obituary notice of, 521

Noble, G. H., exposing the bladder in suprapubic operations, 68
formation of a plastic vagina, 165, 167
treatment of cancer, 378

Oechsner, J. F., chronic urethritis, 62
Oliver, J. C., removal of a tumor of uncertain character from the liver, 38
suppurating echinococcus cyst of the liver, 35
Omentopexy, 219
Operation on upper bowel, 490
Operations for cancer, 467
on gall passages, 25
Operative procedures, complications following, 199
Ovarian cysts, large, 185

Pain in the abdomen and pelvis, 452
Palate defect after infancy, 479
Pancreas, cysts of, 252
Parham, F. W., omentopexy, 234
operation on the upper bowel, 516
pylorospasm, 422
Park, R., treatment of cancer, 346, 380
Pellagra, transfusion in, 426

Peterson, R., Cesarean section, 145
ectopic gestation, 136
exposing the bladder in suprapubic operations, 68
formation of a plastic vagina, 165
technique of the radical abdominal operation for uterine cancer, 363, 380
Plastic vagina, formation of a, 147
Pylorospasm, 419

Reed, C. A. L., practical application of the autonomic nerve function in the control of pain originating in the abdomen and pelvis, 452
Renal tuberculosis, 104
Richardson, M. H., omentopexy, 219, 239
operation on the upper bowel, 515, 516
Roberts, W. O., Southern surgeons and surgery—before, during, and after the Civil War, 1
Rogers, M., aneurysm, 197
operation on the upper bowel, 513
pylorospasm, 424
Royster, H. A., anteflexion of uterus, 183
intussusception in the adult, 404
thyroidectomy, 214

Sarcoma of cecum, 391
Saunders, B., ectopic gestation, 133
operations on the gall passages, 33
Scott, A. C., a position for saving time and facilitating combined abdominal and pelvic outlet operations, 170, 176
Sherrill, J. G., aneurysm, 190
ectopic gestation, 135
operation on the upper bowel, 513
operations on the gall passages, 32
renal tuberculosis, 114
Southern surgeons and surgery—before, during, and after the Civil War, 1
Spinal cord, complete destruction of, 434
Stone in the ureter, 72
Suppurating echinococcus cyst of the liver, 35

Thompson, J. E., complete destruction of the spinal cord, 443
hypernephroma arising in the right testicle, 408
volvulus of cecum, 389
Thyroidectomy, 208
Trachea, collapse of, 208
Tuberculosis, renal, 104
Tumor of liver, 38

Ureter, stone in, 72
Ureteritis, chronic, 44
Urethritis, chronic, 44
Uterine cancer, technique of the radical abdominal operation for uterine cancer, 363
Uterus, anteflexion of, 178

Vagina, complete absence of, 147
Vaughan, G. T., acute multiple urogenous abscess of the kidney resembling acute unilateral hematogenous nephritis, 461
Volvulus of the cecum, 381

Wathen, W. H., acute intestinal obstruction, 248
Wathen, J. R., goitre operations, 205, 217
Watts, S. H., complete destruction of the spinal cord, 442
intussusception in the adult, 391, 407
operation on the upper bowel, 514
volvulus of cecum, 389
Whitacre, H. J., volvulus of the cecum, 381, 390
Wilson, J. T., obituary notice of, 525
Winslow, R., complete transverse destruction of the spinal cord, 433, 442, 444
operations on the gall passages, 32
thyroidectomy, 215
tumor of liver, 42
Witherspoon, T. C., collapse of the trachea while performing thyroidectomy, 208, 217

Zinke, E. G., Cesarean section, 143
ectopic gestation, 121